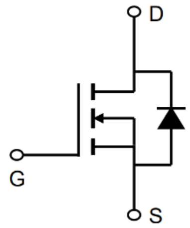
APM
A Power Microelectronics

AP6N03LI

30V N-Channel Enhancement Mode MOSFET

Description

The AP6N03LI 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.

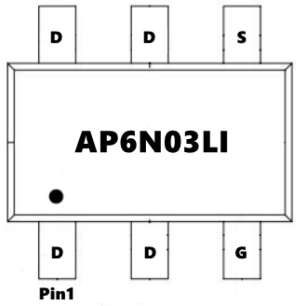


General Features

V_{DS} = 30V I_D =6A

$R_{DS(ON)}$ < 28mΩ @ V_{GS}=10V （Type：20mΩ）

$R_{DS(ON)}$ < 32mΩ @ V_{GS}=4.5V (Type：25mΩ)

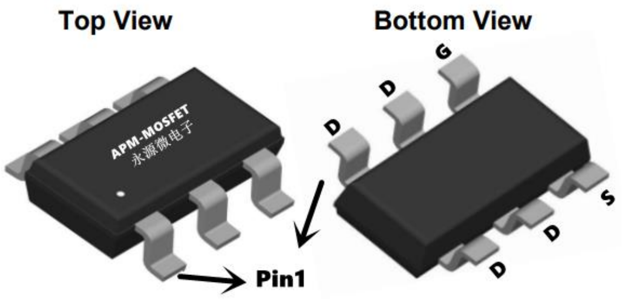


Application

Battery protection

Load switch

Uninterruptible power supply



Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
AP6N03LI	SOT23-6L	AP6N03LI	3000

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

Symbol	Parameter	Rating	Units
VDS	Drain-Source Voltage	30	V
VGS	Gate-Source Voltage	±12	V
I_D@T_A=25℃	Continuous Drain Current, V_{GS} @ 10V[1]	6	A
I_D@T_A=70℃	Continuous Drain Current, V_{GS} @ 10V[1]	4.7	A
IDM	Pulsed Drain Current[2]	30	A
P_D@T_A=25℃	Total Power Dissipation[3]	1.5	W
TSTG	Storage Temperature Range	-55 to 150	℃
T_J	Operating Junction Temperature Range	-55 to 150	℃
$R_{\theta}JA$	Thermal Resistance Junction-ambient[1]	125	℃/W
$R_{\theta}JC$	Thermal Resistance Junction-Case[1]	30	℃/W

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

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BVDSS	Drain-Source Breakdown Voltage	V_{GS}=0V , I_D=250uA	30	33	---	V
△BVDSS/△TJ	BVDSS Temperature Coefficient	Reference to 25℃ , I_D=1mA	---	0.021	---	V/℃
RDS(ON)	Static Drain-Source On-Resistance	V_{GS}=10V , I_D=5A	---	20	28	mΩ
RDS(ON)	Static Drain-Source On-Resistance	V_{GS}=4.5V , I_D=3A	---	25	32	mΩ
RDS(ON)	Static Drain-Source On-Resistance	V_{GS}=2.5V , I_D=1A	---	36	45	mΩ
VGS(th)	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =250uA	0.5	0.9	1.5	V
△$V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	-5	---	mV/℃
IDSS	Drain-Source Leakage Current	V_{DS}=24V , V_{GS}=0V , T_J=25℃	---	---	1	uA
		V_{DS}=24V , V_{GS}=0V , T_J=55℃	---	---	5	
IGSS	Gate-Source Leakage Current	V_{GS}=±20V , V_{DS}=0V	---	---	±100	nA
gfs	Forward Transconductance	V_{DS}=5V , I_D=5A	---	7	---	S
R_g	Gate Resistance	V_{DS}=0V , V_{GS}=0V , f=1MHz	---	2.5	5	Ω
Q_g	Total Gate Charge (4.5V)	V_{DS}=15V , V_{GS}=4.5V , I_D=5A	---	6	8.4	nC
Qgs	Gate-Source Charge		---	2.5	3.5	
Qgd	Gate-Drain Charge		---	2.1	2.9	
Td(on)	Turn-On Delay Time	V_{DD}=15V , V_{GS}=10V , R_G=3.3Ω I_D=5A	---	2.4	4.8	ns
T_r	Rise Time		---	7.8	14	
Td(off)	Turn-Off Delay Time		---	22	44	
T_f	Fall Time		---	4	8	
Ciss	Input Capacitance	V_{DS}=15V , V_{GS}=0V , f=1MHz	---	572	800	pF
Coss	Output Capacitance		---	81	112	
Crss	Reverse Transfer Capacitance		---	65	91	
IS	Continuous Source Current[1,4]	V_G=V_D=0V , Force Current	---	---	5.8	A
ISM	Pulsed Source Current[2,4]		---	---	30	A
VSD	Diode Forward Voltage[2]	V_{GS}=0V , I_S=3A , T_J=25℃	---	---	1.2	V
trr	Reverse Recovery Time	IF=5A , dI/dt=100A/μs , T_J=25℃	---	19	---	nS
Q_{rr}	Reverse Recovery Charge		---	1.04	---	nC

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

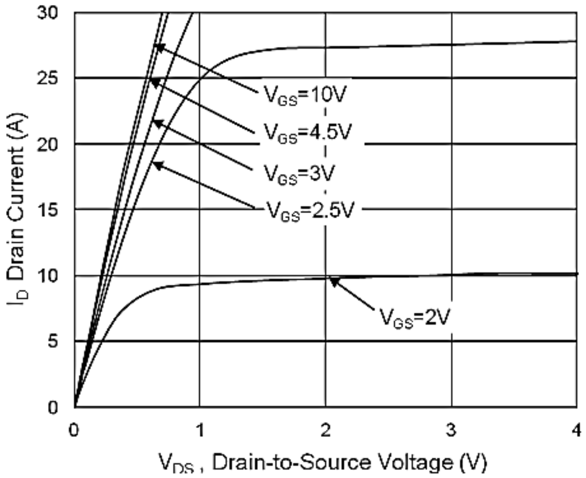


Fig.1 Typical Output Characteristics

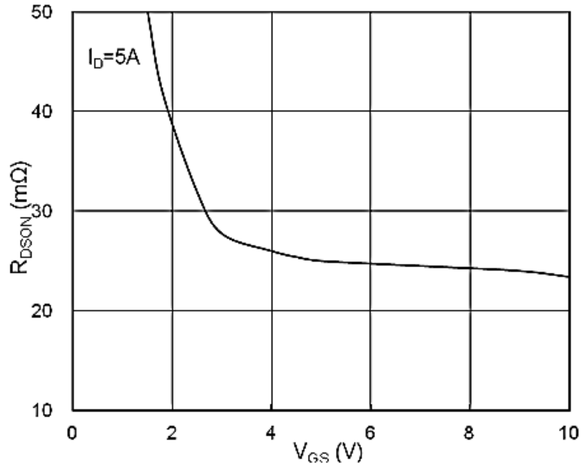


Fig.2 On-Resistance vs. Gate-Source

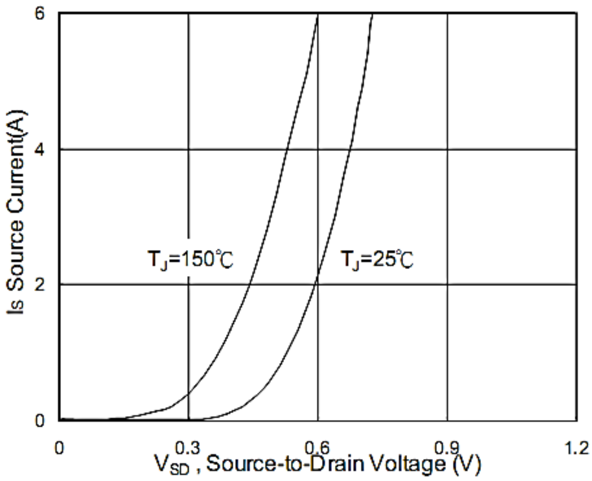


Fig.3 Forward Characteristics Of Reverse

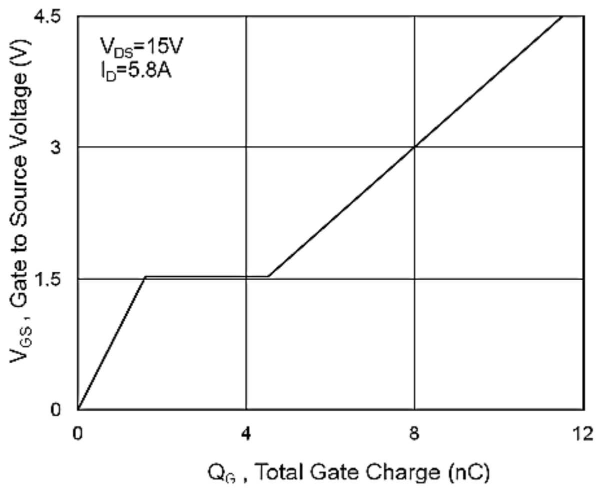


Fig.4 Gate-Charge Characteristics

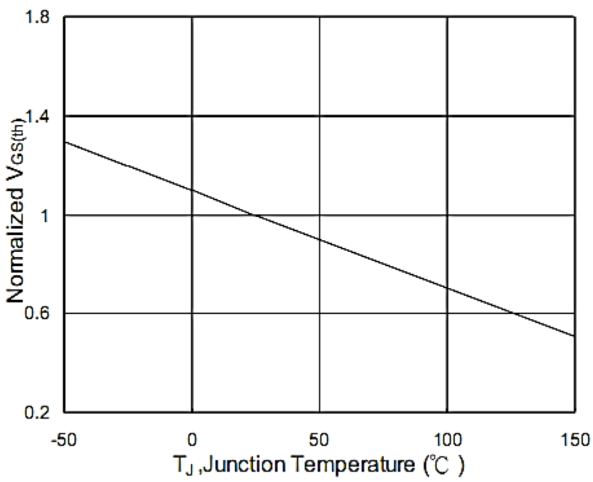


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

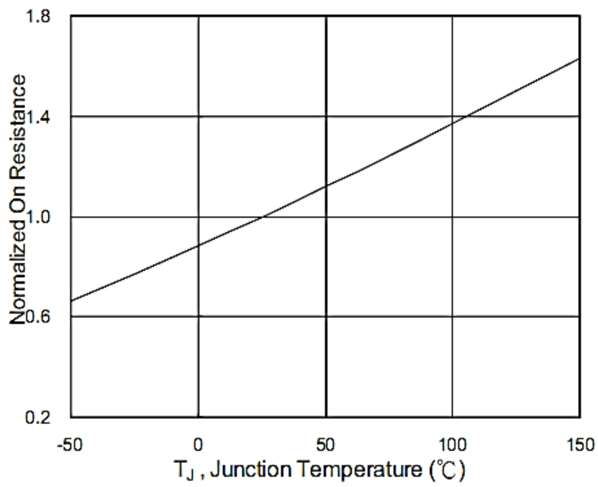


Fig.6 Normalized R_{DSON} vs. T_J

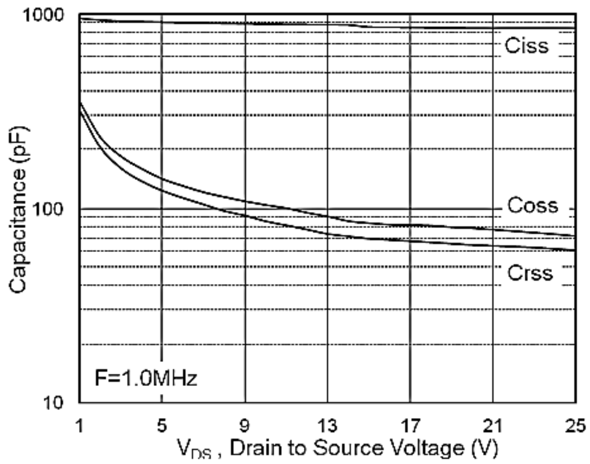


Fig.7 Capacitance

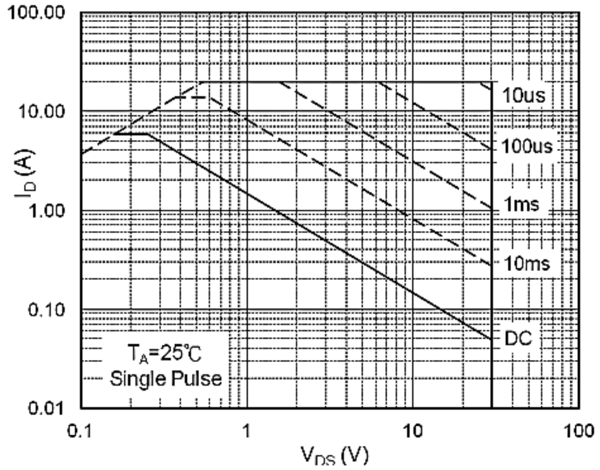


Fig.8 Safe Operating Area

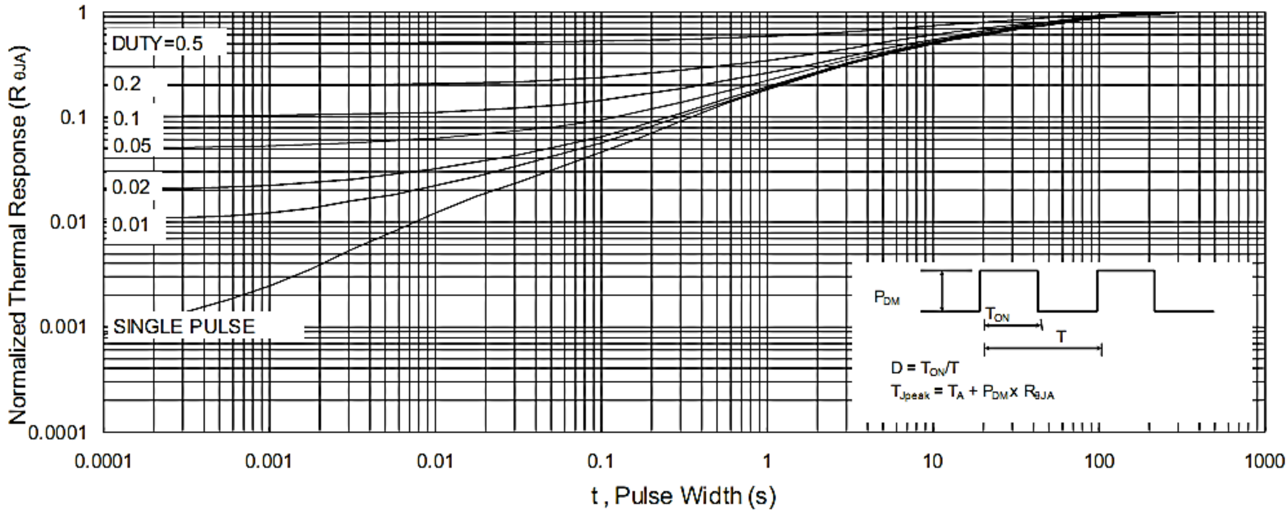


Fig.9 Normalized Maximum Transient Thermal Impedance

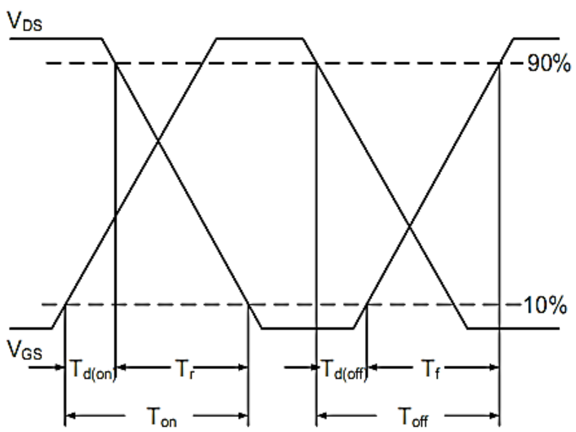


Fig.10 Switching Time Waveform

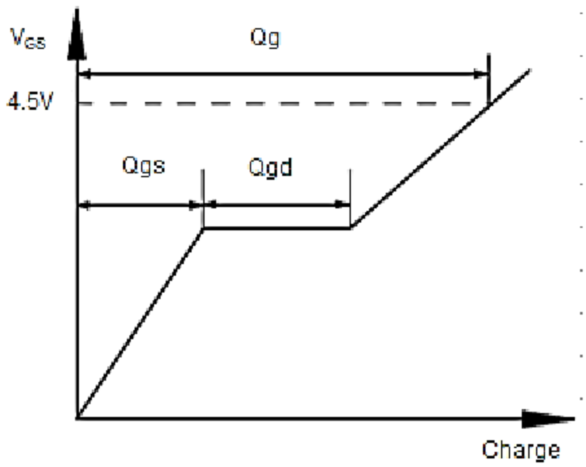
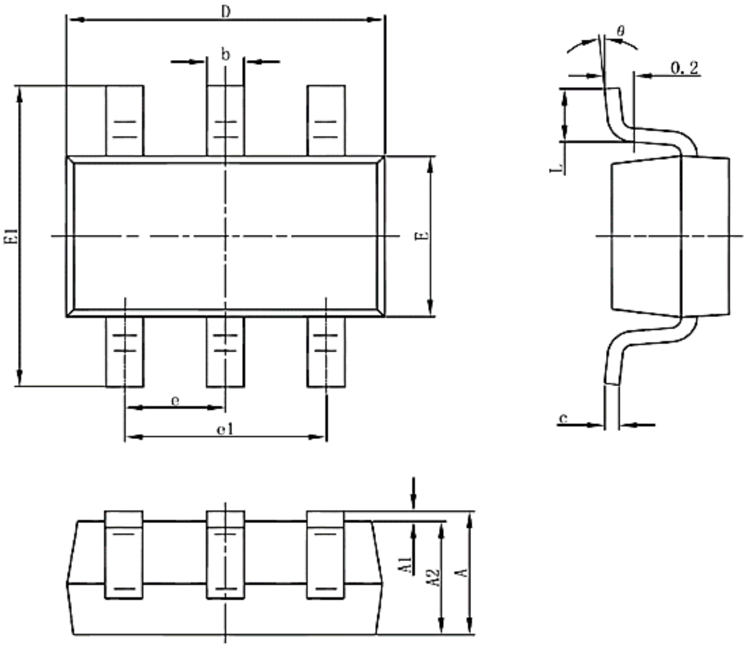


Fig.11 Gate Charge Waveform

Package Mechanical Data-SOT23-6-Single



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
C	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950（BSC）		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0	8	0	8

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Edition	Date	Change
Rve1.0	2021/12/21	Initial release

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