

60V N-Channel Enhancement Mode MOSFET

Description

The AP6N06LI 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

$V_{DS} = 60V$ $I_D = 6A$

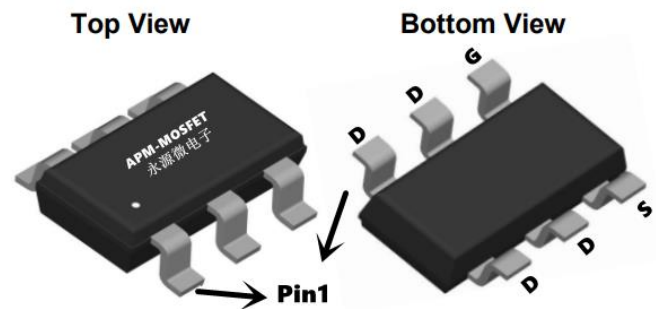
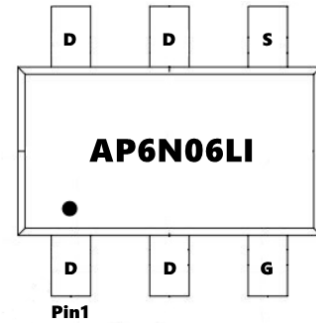
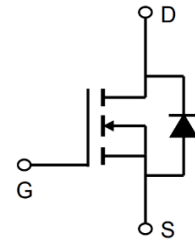
$R_{DS(ON)} < 40m\Omega$ @ $V_{GS}=10V$ (Type: 36m Ω)

Application

LED lamp

Load switch

Uninterruptible power supply



Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
AP6N06LI	SOT23-6L	AP6N06LI	300

Absolute Maximum Ratings@ $T_J=25^{\circ}C$ (unless otherwise specified)

Symbol	Parameter	Max.	Units
V_{DSS}	Drain-Source Voltage	60	V
V_{GSS}	Gate-Source Voltage	± 20	V
$I_{D@T_C=25^{\circ}C}$	Continuous Drain Current, $V_{GS} @ 10V^1$	6	A
$I_{D@T_C=100^{\circ}C}$	Continuous Drain Current, $V_{GS} @ 10V^1$	3.5	A
I_{DM}	Pulsed Drain Current	18	A
E_{AS}	Single Pulsed Avalanche Energy	22	mJ
$P_D@T_C=25^{\circ}C$	Power Dissipation	2	W
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +175	$^{\circ}C$
$R_{\theta JA}$	Thermal Resistance Junction-Ambient ¹	125	$^{\circ}C/W$
$R_{\theta JC}$	Thermal Resistance Junction-Case ¹	4	$^{\circ}C/W$

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Electrical Characteristics ($T_J=25^\circ\text{C}$, unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BVDSS	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	60	65	---	V
$\Delta BVDSS/\Delta T_J$	BVDSS Temperature Coefficient	Reference to $25^\circ\text{C}, I_D=1mA$	---	0.044	---	V/ $^\circ\text{C}$
RDS(ON)	Static Drain-Source On-Resistance ²	$V_{GS}=10V, I_D=15A$	---	36	40	m Ω
		$V_{GS}=4.5V, I_D=7A$	---	40	48	m Ω
VGS(th)	Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=250\mu A$	1.2	1.6	2.5	V
$\Delta V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	-4.8	---	mV/ $^\circ\text{C}$
IDSS	Drain-Source Leakage Current	$V_{DS}=48V, V_{GS}=0V, T_J=25^\circ\text{C}$	---	---	1	μA
		$V_{DS}=48V, V_{GS}=0V, T_J=55^\circ\text{C}$	---	---	5	
IGSS	Gate-Source Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	---	---	± 100	nA
gfs	Forward Transconductance	$V_{DS}=5V, I_D=15A$	---	25.3	---	S
Rg	Gate Resistance	$V_{DS}=0V, V_{GS}=0V, f=1MHz$	---	2.5	---	Ω
Qg	Total Gate Charge (10V)	$V_{DS}=48V, V_{GS}=10V, I_D=15A$	---	19	---	nC
Qgs	Gate-Source Charge		---	2.5	---	
Qgd	Gate-Drain Charge		---	5	---	
Td(on)	Turn-On Delay Time	$V_{DD}=30V, V_{GS}=10V, R_G=3.3\Omega, I_D=15A$	---	2.8	---	ns
Tr	Rise Time		---	16.6	---	
Td(off)	Turn-Off Delay Time		---	21.2	---	
Tf	Fall Time		---	5.6	---	
Ciss	Input Capacitance	$V_{DS}=15V, V_{GS}=0V, f=1MHz$	---	1027	---	pF
Coss	Output Capacitance		---	65	---	
Crss	Reverse Transfer Capacitance		---	46	---	
Is	Continuous Source Current ^{1,6}	$V_G=V_D=0V, \text{Force Current}$	---	---	20	A
ISM	Pulsed Source Current ^{2,6}		---	---	40	A
VSD	Diode Forward Voltage ²	$V_{GS}=0V, I_S=1A, T_J=25^\circ\text{C}$	---	---	1.2	V
trr	Reverse Recovery Time	$I_F=15A, dI/dt=100A/\mu s, T_J=25^\circ\text{C}$	---	12.2	---	nS
Qrr	Reverse Recovery Charge		---	7.3	---	nC

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 .The EAS data shows Max. rating .
- 3、The test cond $\cong 300\mu s$ duty cycle $\cong 2\%$, duty cycle ition is $T_J=25^\circ\text{C}, V_{DD}=48V, V_G=10V, R_G=25\Omega, L=0.1mH, I_{AS}=13A$
- 4、The power dissipation is limited by 175°C junction temperature
- 5、The data is theoretically the same as ID and IDM , in real applications , should be limited by total power dissipation.

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Typical Characteristics

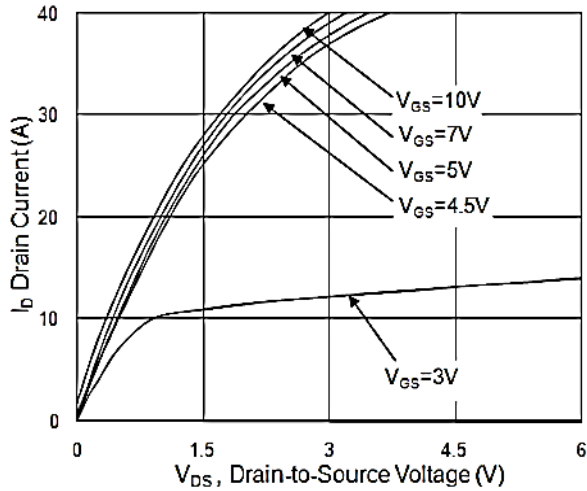


Fig.1 Typical Output Characteristics

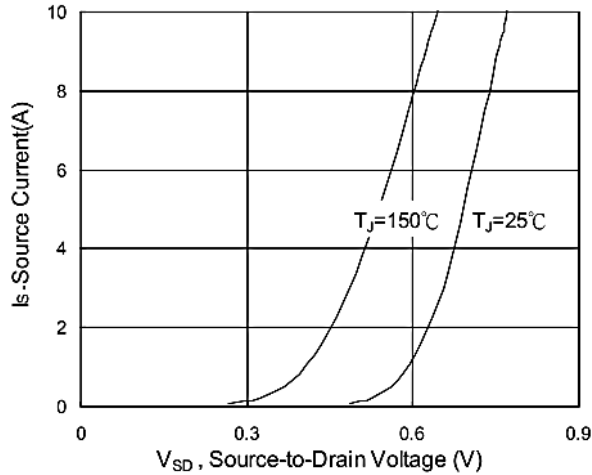


Fig.3 Forward Characteristics Of Reverse

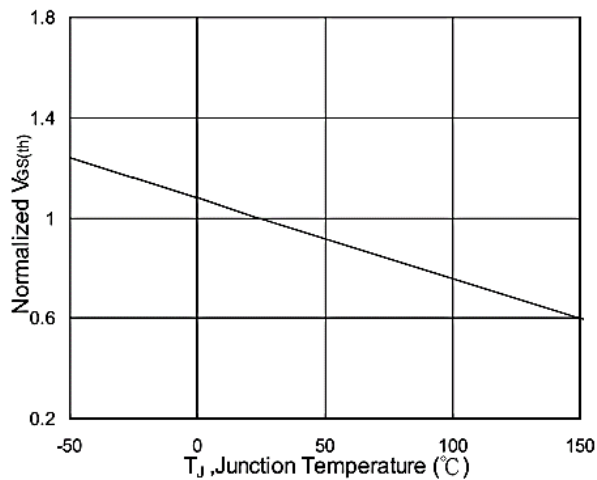


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

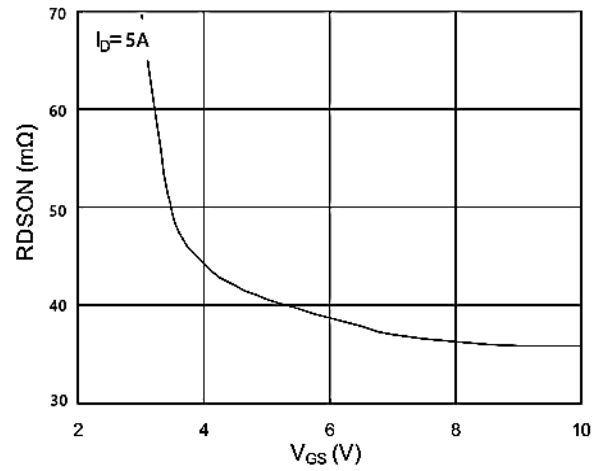


Fig.2 On-Resistance vs. Gate-Source

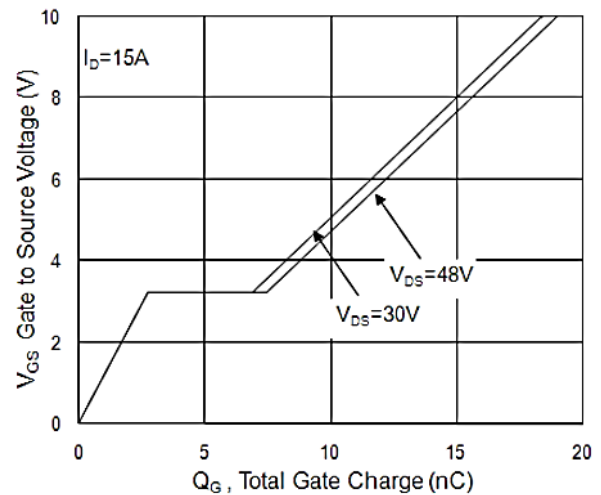


Fig.4 Gate-Charge Characteristics

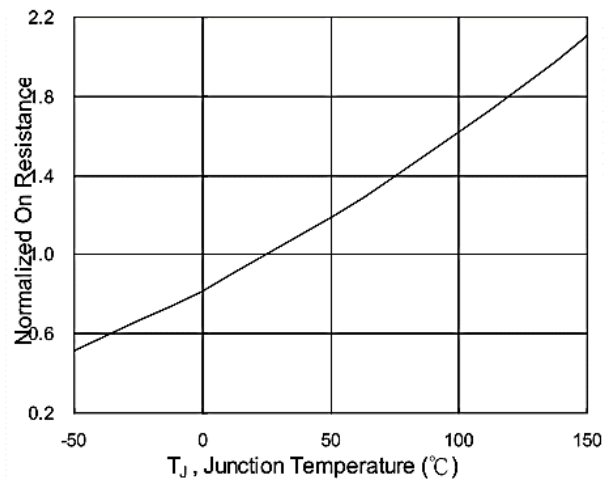


Fig.6 Normalized $R_{DS(on)}$ vs. T_J



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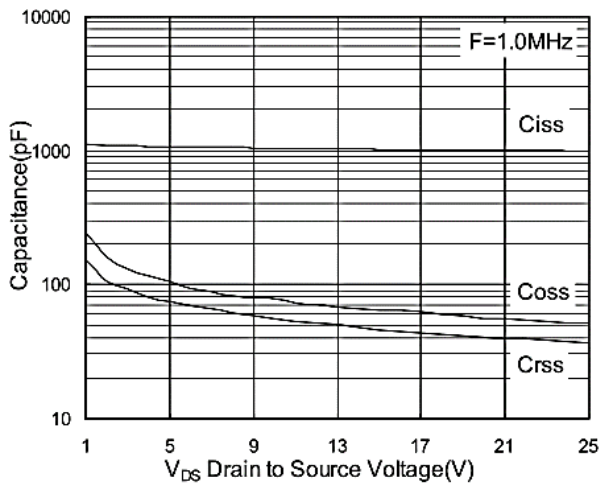


Fig.7 Capacitance

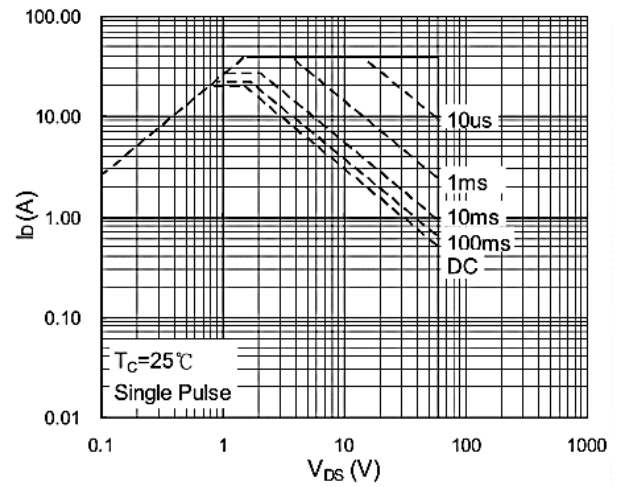


Fig.8 Safe Operating Area

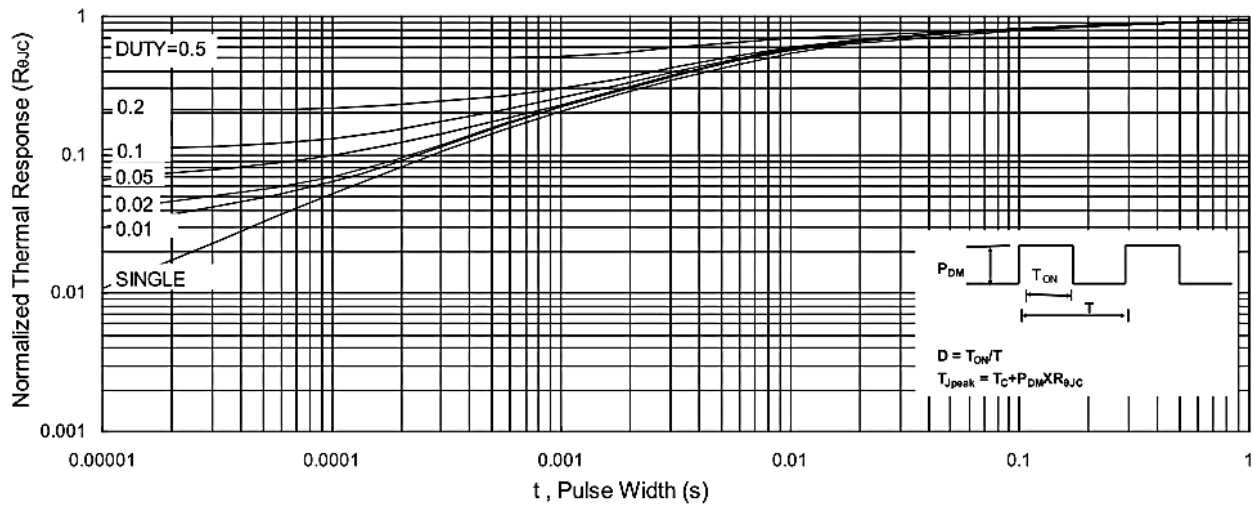


Fig.9 Normalized Maximum Transient Thermal Impedance

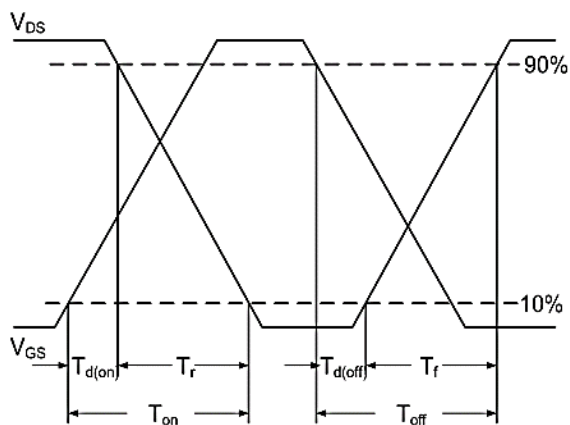


Fig.10 Switching Time Waveform

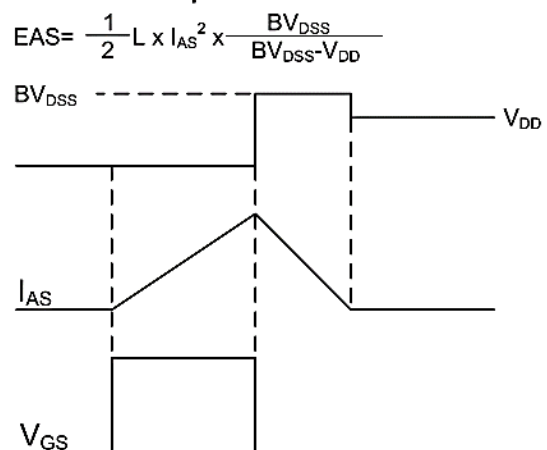
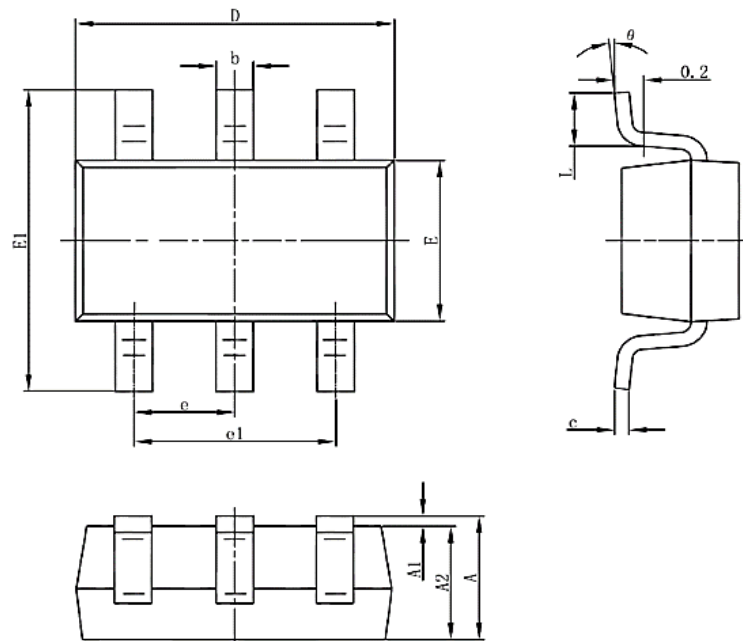


Fig.11 Unclamped Inductive Switching Waveform

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

60V N-Channel Enhancement Mode MOSFET**Attention**

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

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