AP3P06LI

-60V P-Channel Enhancement Mode MOSFET

Description

The AP3P06LI 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.
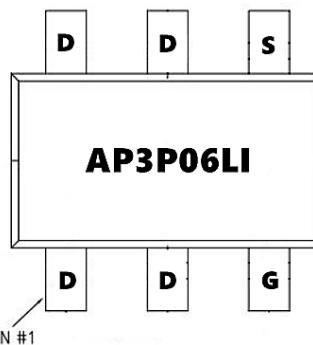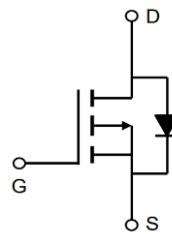
General Features

V_{DS} = -60V I_D =-3.8A

$R_{DS(ON)}$ < -150mΩ @ V_{GS}=-10V （**Type：125mΩ**）

Application

Battery protection

Load switch

Uninterruptible power supply
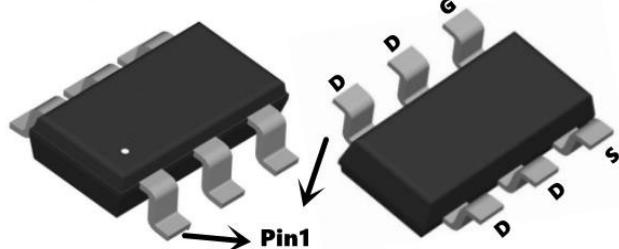
Top View   Bottom View

Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
AP3P06LI	SOT23-6L	AP3P06LI	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_A=25℃	Continuous Drain Current, V_{GS} @ -10V[1]	-3.8	A
I_D@T_A=70℃	Continuous Drain Current, V_{GS} @ -10V[1]	-2.4	A
I_{DM}	Pulsed Drain Current[2]	-12	A
P_D@T_A=25℃	Total Power Dissipation[3]	1.5	W
T_{STG}	Storage Temperature Range	-55 to 150	℃
T_J	Operating Junction Temperature Range	-55 to 150	℃
$R_{θJA}$	Thermal Resistance Junction-Ambient [1]	125	℃/W
$R_{θJC}$	Thermal Resistance Junction-Case[1]	80	℃/W

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Electrical Characteristics (T$_C$=25℃ unless otherwise noted)

| Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV$_{DSS}$	Drain-Source Breakdown Voltage	V$_{GS}$=0V , I$_D$=-250uA	-60	-67	---	V
△BV$_{DSS}$/△T$_J$	BV$_{DSS}$ Temperature Coefficient	Reference to 25℃ , I$_D$=-1mA	---	-0.021	---	V/℃
R$_{DS(ON)}$	Static Drain-Source On-Resistance[2]	V$_{GS}$=-10V , I$_D$=-1.5A	---	125	150	mΩ
		V$_{GS}$=-4.5V , I$_D$=-1A	---	158	200	
V$_{GS(th)}$	Gate Threshold Voltage	V$_{GS}$=V$_{DS}$, I$_D$ =-250uA	-1.0	1.7	-2.5	V
△V$_{GS(th)}$	V$_{GS(th)}$ Temperature Coefficient		---	4.08	---	mV/℃
I$_{DSS}$	Drain-Source Leakage Current	V$_{DS}$=-48V , V$_{GS}$=0V , T$_J$=25℃	---	---	1	uA
		V$_{DS}$=-48V , V$_{GS}$=0V , T$_J$=55℃	---	---	5	
I$_{GSS}$	Gate-Source Leakage Current	V$_{GS}$=±20V , V$_{DS}$=0V	---	---	±100	nA
gfs	Forward Transconductance	V$_{DS}$=-5V , I$_D$=-1.5A	---	5.9	---	S
Q$_g$	Total Gate Charge (-4.5V)	V$_{DS}$=-20V , V$_{GS}$=-4.5V , I$_D$=-1.5A	---	4.6	---	nC
Q$_{gs}$	Gate-Source Charge		---	1.4	---	
Q$_{gd}$	Gate-Drain Charge		---	1.62	---	
T$_{d(on)}$	Turn-On Delay Time	V$_{DS}$=-15V , V$_{GS}$=-10V , R$_G$=3.3Ω, I$_D$=-1A	---	17.4	---	ns
T$_r$	Rise Time		---	5.4	---	
T$_{d(off)}$	Turn-Off Delay Time		---	37.2	---	
T$_f$	Fall Time		---	2.4	---	
C$_{iss}$	Input Capacitance	V$_{DS}$=-15V , V$_{GS}$=0V , f=1MHz	---	531	---	pF
C$_{oss}$	Output Capacitance		---	59	---	
C$_{rss}$	Reverse Transfer Capacitance		---	38	---	
I$_S$	Continuous Source Current[1,4]	V$_G$=V$_D$=0V , Force Current	---	---	-1.7	A
I$_{SM}$	Pulsed Source Current[2,4]		---	---	-7	A
V$_{SD}$	Diode Forward Voltage[2]	V$_{GS}$=0V , I$_S$=-1A , T$_J$=25℃	---	---	-1.2	V

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 ≦ 300us , duty cycle ≦ 2%

3、The power dissipation is limited by 150℃ junction temperature

4、The data is theoretically the same as ID and IDM , in real applications , should be limited by total power dissipation.

### -60V P-Channel Enhancement Mode MOSFET

P-Channel Typical Characteristics
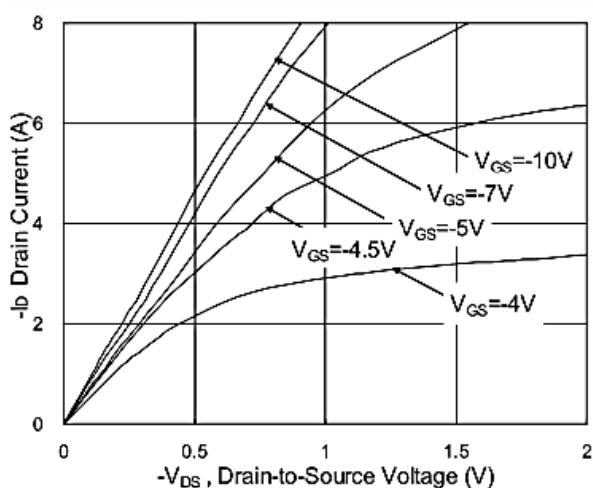
Fig.1 Typical Output Characteristics
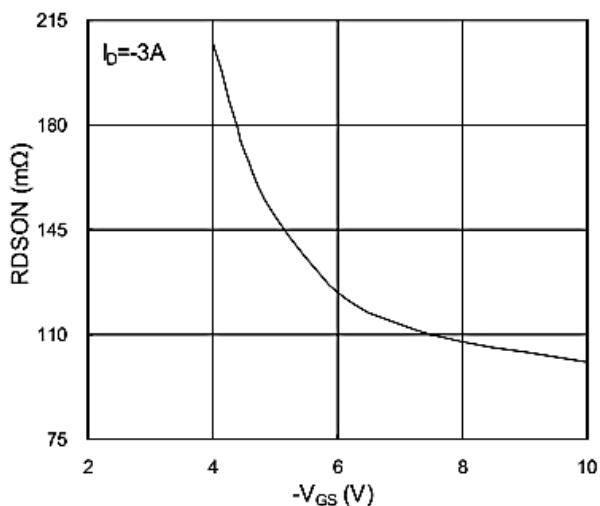

Fig.2 On-Resistance vs. G-S Voltage
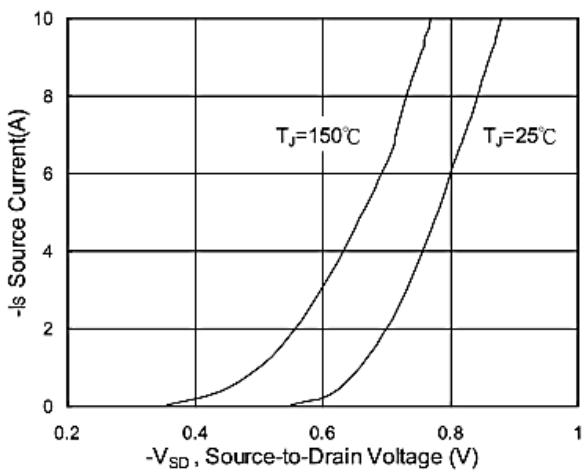

Fig.3 Forward Characteristics Of Reverse
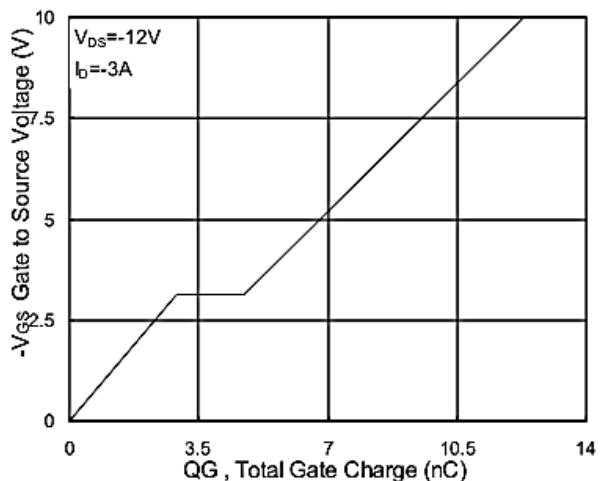
Fig.4 Gate-Charge Characteristics
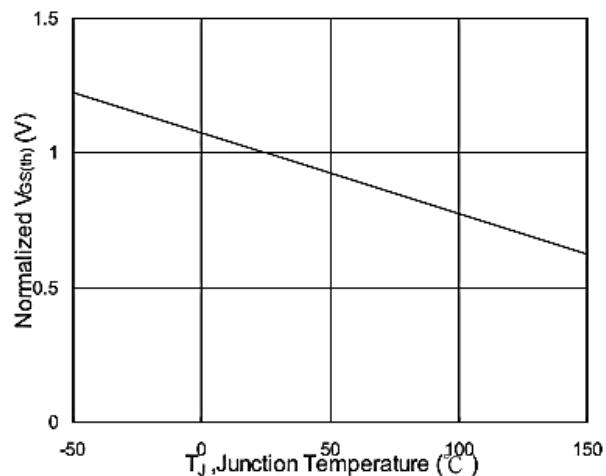
Fig.5 Normalized $V_{GS(th)}$ vs. T_J
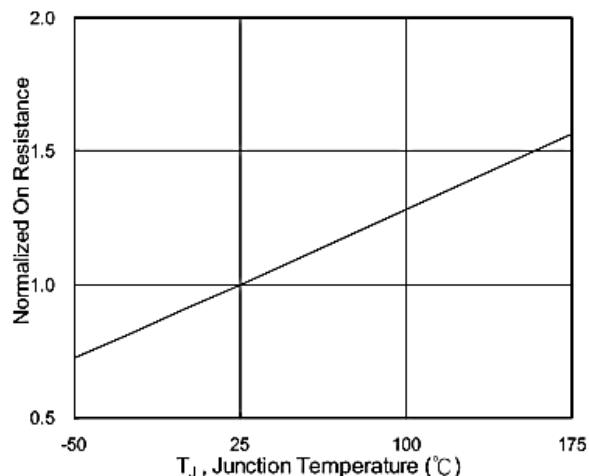
Fig.6 Normalized R_{DSON} vs. T_J
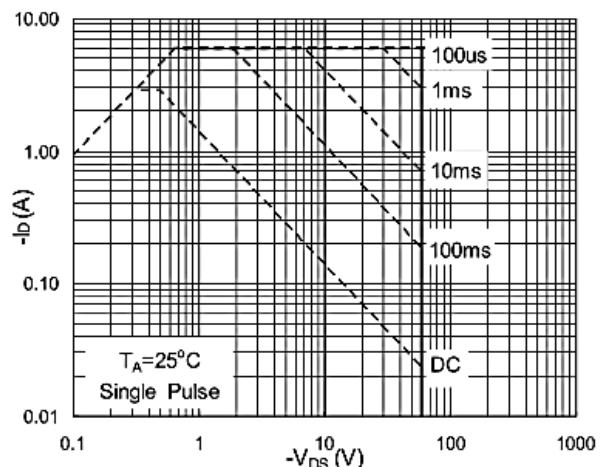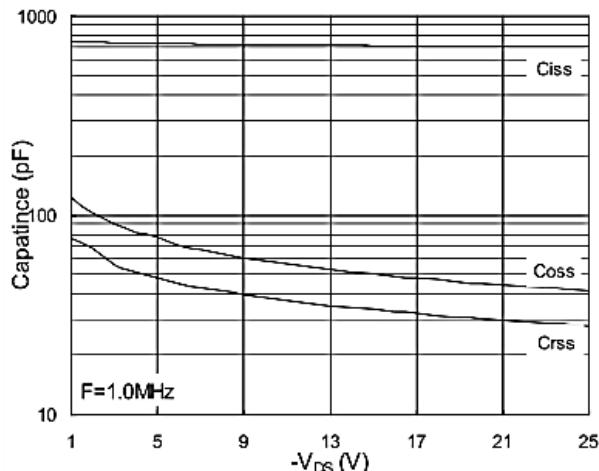
Fig.7 Capacitance

Fig.8 Safe Operating Area
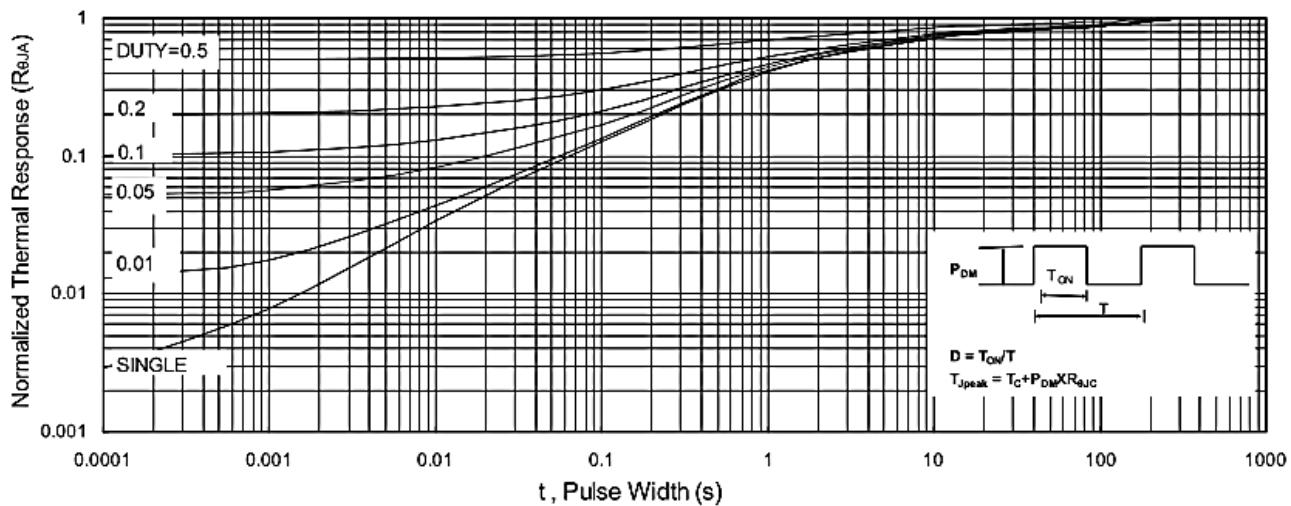
Fig.9 Normalized Maximum Transient Thermal Impedance

$$D = T_{ON}/T$$
$$T_{Jpeak} = T_C + P_{DM} X R_{\theta JC}$$
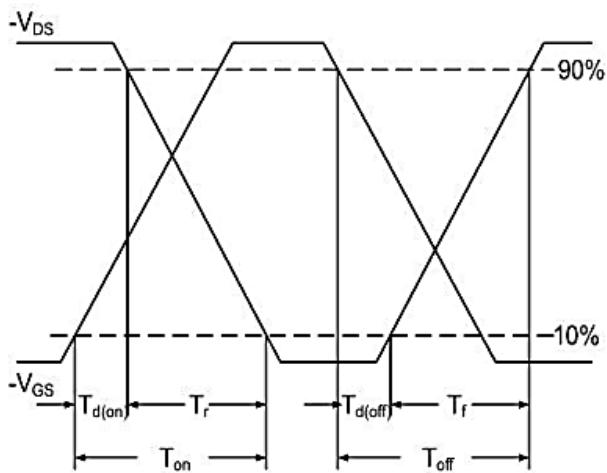
Fig.10 Switching Time Waveform

$$EAS = \frac{1}{2} L \times (-I_{AS}^2) \times \frac{-BV_{DSS}}{-BV_{DSS} - (-V_{DD})}$$
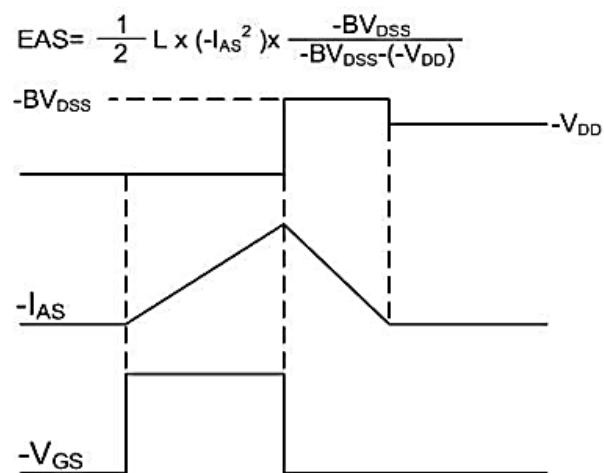
Fig.11 Unclamped Inductive Waveform

Package Mechanical Data-SOT23-6-Single
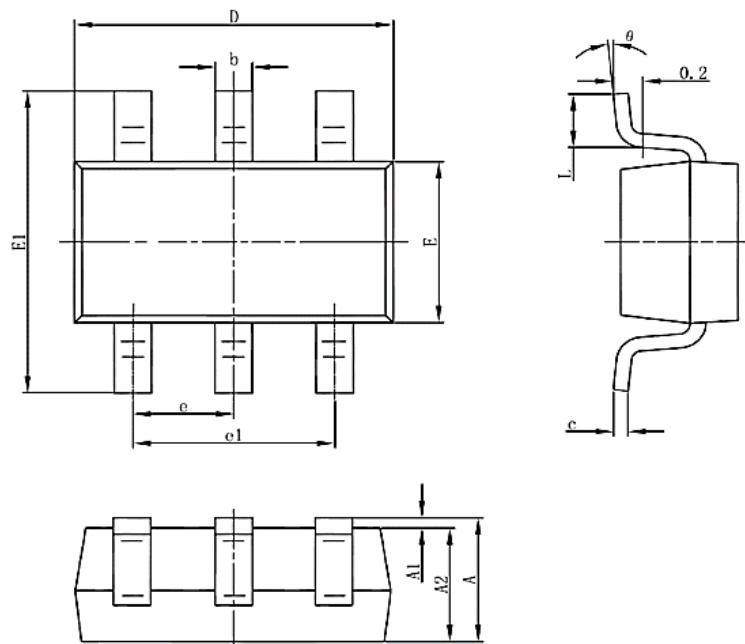
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
C	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950 （BSC)		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