

-30V P-Channel Enhancement Mode MOSFET

Description

The AP40P03S 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

$V_{DS} = -30V$ $I_D = -40A$

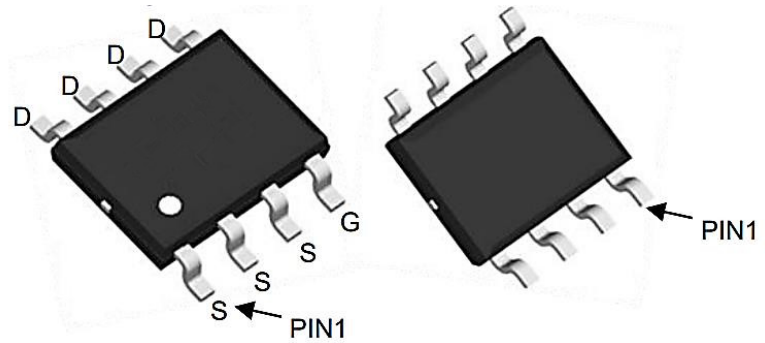
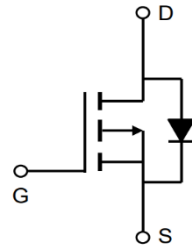
$R_{DS(ON)} < 4.0m\Omega$ @ $V_{GS} = -10V$ (Type: 3.2m Ω)

Application

Lithium battery protection

Wireless impact

Mobile phone fast charging



Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
AP40P03S	SOP-8L	AP40P03S XXX YYYY	3000

Absolute Maximum Ratings (TC=25°C unless otherwise noted)

Symbol	Parameter	Rating	Units
V _{DS}	Drain-Source Voltage	-30	V
V _{GS}	Gate-Source Voltage	±20	V
I _D @TC=25°C	Continuous Drain Current, V _{GS} @ -10V ¹	-40	A
I _D @TC=100°C	Continuous Drain Current, V _{GS} @ -10V ¹	-31	A
I _{DM}	Pulsed Drain Current ²	-160	A
E _{AS}	Single Pulse Avalanche Energy ³	576	mJ
P _D @TC=25°C	Total Power Dissipation ⁴	150	W
T _{STG}	Storage Temperature Range	-55 to 150	°C
T _J	Operating Junction Temperature Range	-55 to 150	°C
R θ JA	Thermal Resistance Junction-Ambient 1	85	°C/W
R θ JC	Thermal Resistance Junction-Case ¹	1.06	°C/W

-30V P-Channel Enhancement Mode MOSFET

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 =-250μA	-30	-35		V
IDSS	Zero Gate Voltage Drain Current	V _{DS} =-30V, V _{GS} =0V			-1	μA
IGSS	Gate-Body Leakage Current	V _{GS} =±20V, V _{DS} =0V			±100	nA
VGS(th)	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =-250μA	-1	-1.7	-2.5	V
RDS(ON)	Drain-Source On-State Resistance	V _{GS} =-10V, I _D =-20A		3.2	4.0	mΩ
		V _{GS} =-4.5V, I _D =-20A		4.5	6.0	mΩ
gFS	Forward Transconductance	V _{DS} =-5V, I _D =-20A		65		S
Ciss	Input Capacitance	V _{DS} =-15V, V _{GS} =0V, f=1.0MHz		7000		pF
Coss	Output Capacitance			820		pF
Crss	Reverse Transfer Capacitance			540		pF
Rg	Gate resistance	V _{GS} =0V, V _{DS} =0V, f=1.0MHz		2.2		Ω
td(on)	Turn-on Delay Time	V _{GS} =-10V, V _{DS} =-15V, R _L =0.75Ω, R _{GEN} =3Ω		14		nS
t _r	Turn-on Rise Time			13		nS
td(off)	Turn-Off Delay Time			65		nS
t _f	Turn-Off Fall Time			37		nS
Q _g	Total Gate Charge	V _{GS} =-10V, V _{DS} =-15V, I _D =-20A		130		nC
Q _{gs}	Gate-Source Charge			12		nC
Q _{gd}	Gate-Drain Charge			31		nC
ISD	Source-Drain Current (Body Diode)				-150	A
VSD	Forward on Voltage ^(Note 3)	V _{GS} =0V, I _S =-20A			-1.3	V
trr	Reverse Recovery Time	I _F =-20A, di/dt=100A/μs		30		ns
Q _{rr}	Reverse Recovery Charge	I _F =-20A, di/dt=100A/μs		40		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 EAS data shows Max. rating . The test condition is T_J =25°C, V_{DD}=-15V, V_G=-10V, R_G=25Ω, L=0.5mH, I_{AS}=-30A
- 4、 The power dissipation is limited by 150°C junction temperature
- 5、 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

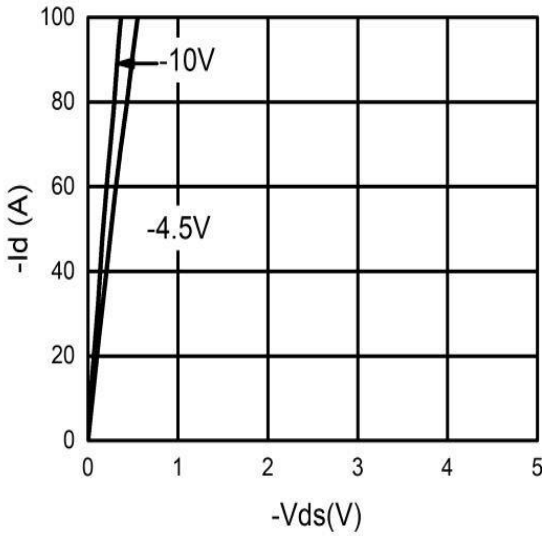


Figure 1. Output Characteristics

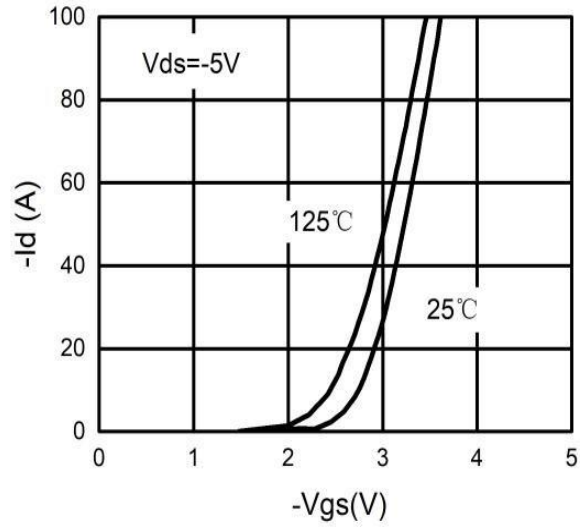


Figure 2. Transfer Characteristics

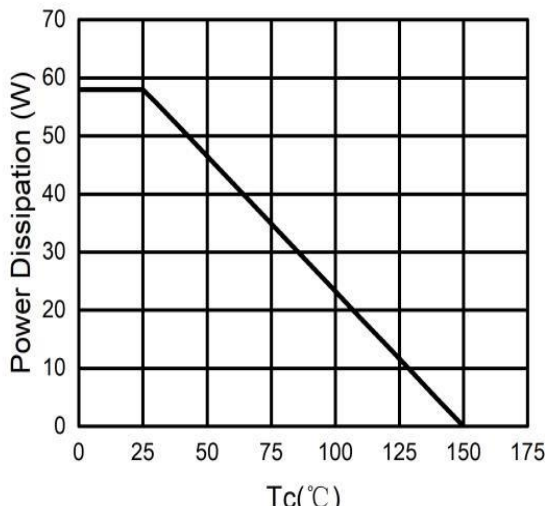


Figure 3. Power Dissipation

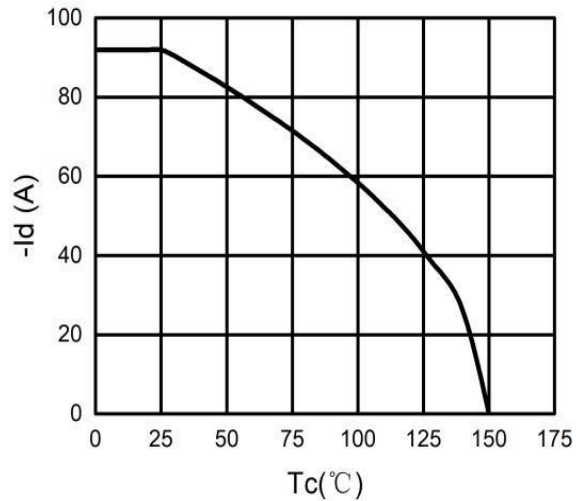


Figure 4. Drain Current

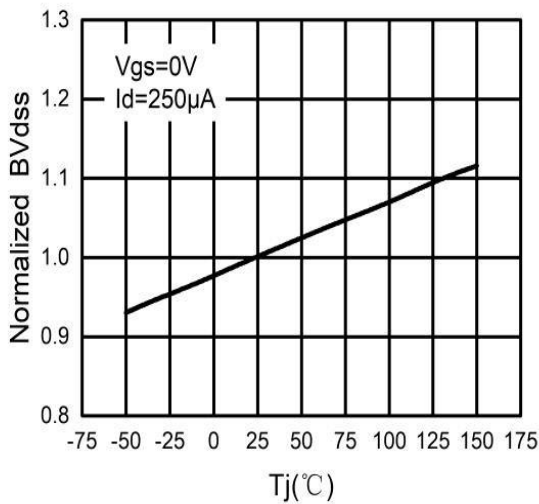


Figure 5. BV_{DSS} vs Junction Temperature

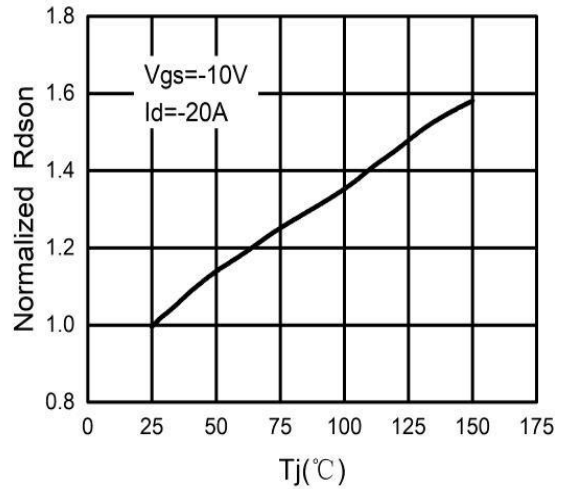


Figure 6. $R_{DS(ON)}$ vs Junction Temperature

-30V P-Channel Enhancement Mode MOSFET

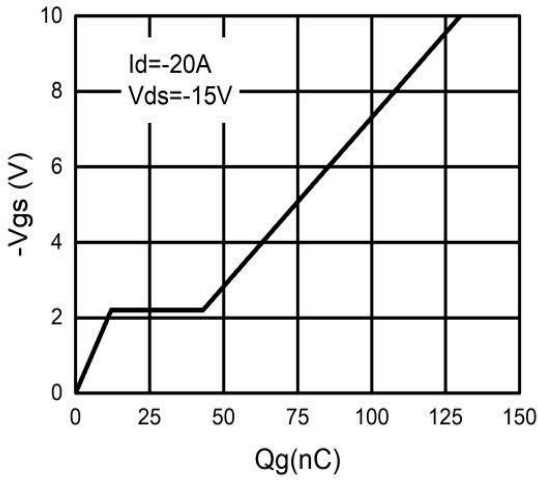


Figure 7. Gate Charge Waveforms

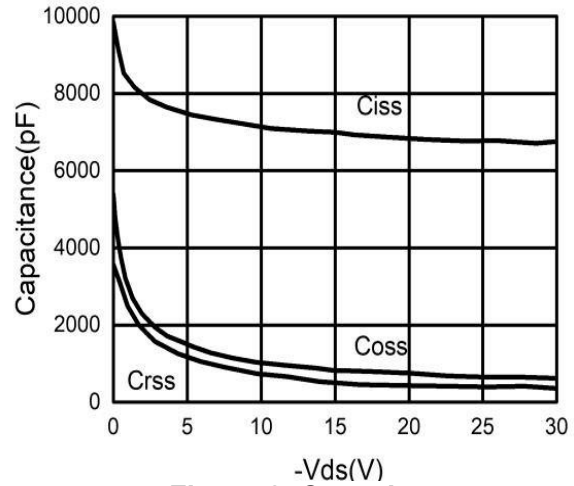


Figure 8. Capacitance

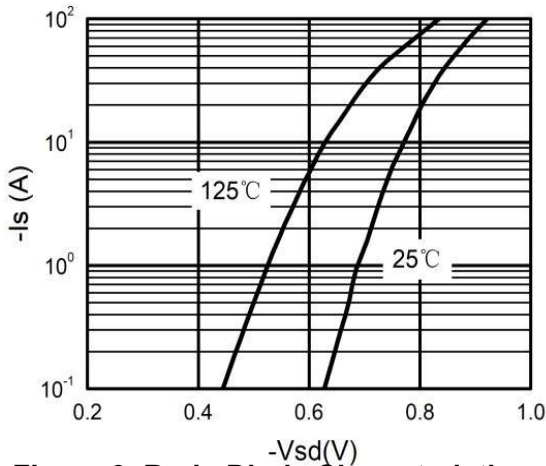


Figure 9. Body-Diode Characteristics

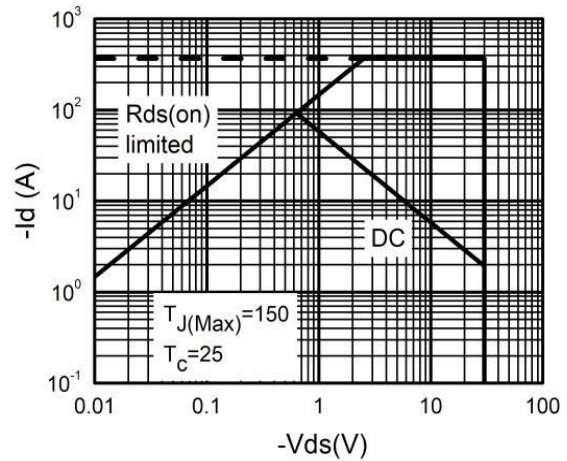


Figure 10. Maximum Safe Operating Area

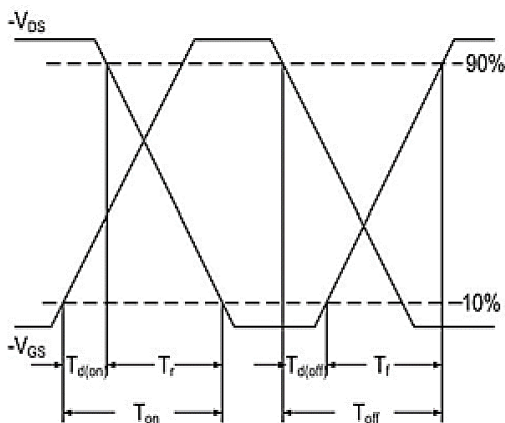


Figure.11 Switching Time Waveform

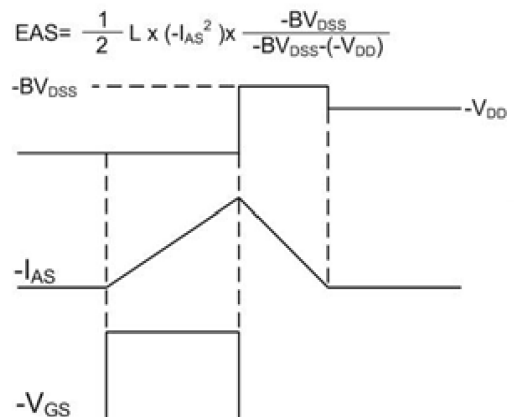
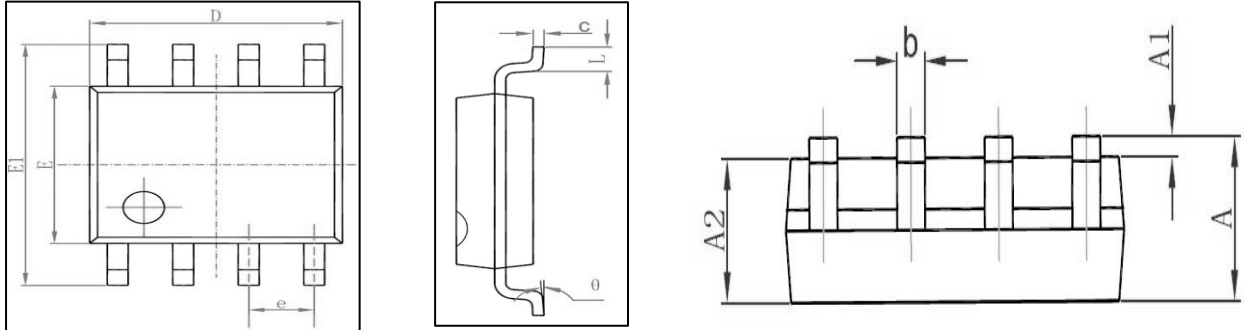


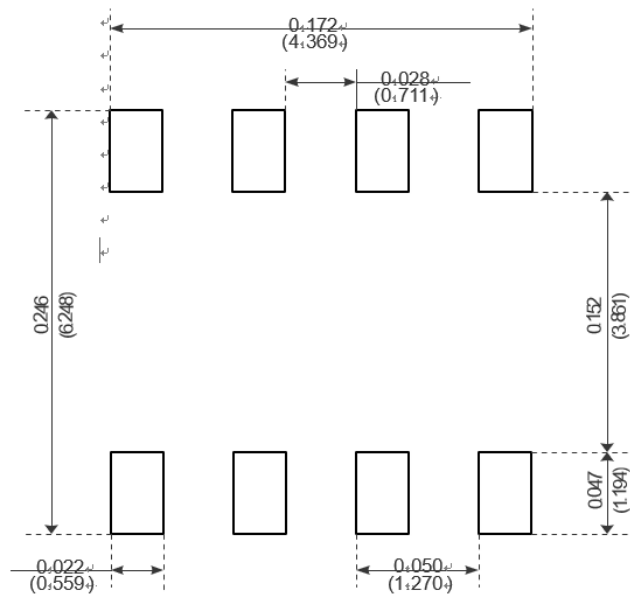
Figure.12 Unclamped Inductive Switching Waveform

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Package Mechanical Data-SOP-8L



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270 (BSC)		0.050 (BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°



Recommended Minimum Pads