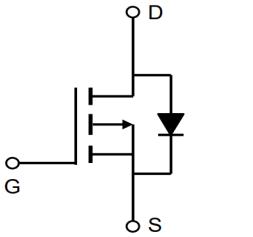
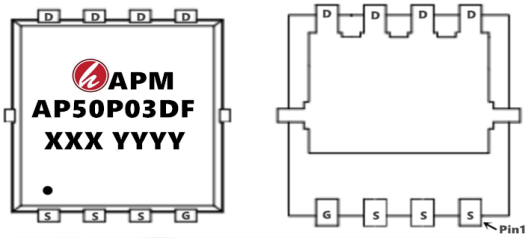
AP50P03DF

-30V P-Channel Enhancement Mode MOSFET

Description

The AP50P03DF 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 =-50 A

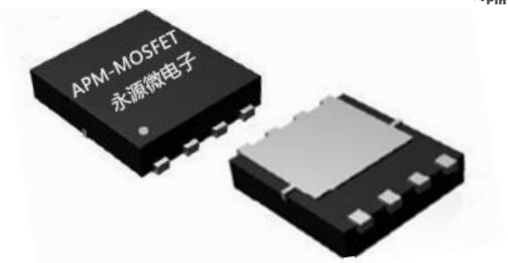
$R_{DS(ON)}$ < -13mΩ @ V_{GS}=-10V

Application

Battery protection

Load switch

Uninterruptible power supply



Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
AP50P03DF	PDFN3*3-8L	AP50P3DF XXX YYYY	5000

Absolute Maximum Ratings (TC=25℃ unless otherwise specified)

Symbol	Parameter	Rating		Units
		10s	Steady State	
VDS	Drain-Source Voltage	-30		V
VGS	Gate-Source Voltage	±20		V
I_D@T_C=25℃	Continuous Drain Current, V_{GS} @ -10V[1]	-50		A
I_D@T_C=100℃	Continuous Drain Current, V_{GS} @ -10V[1]	-27		A
I_D@T_A=25℃	Continuous Drain Current, V_{GS} @ -10V[1]	-14.3	-9	A
I_D@T_A=70℃	Continuous Drain Current, V_{GS} @ -10V[1]	-11.4	-7.2	A
IDM	Pulsed Drain Current[2]	-130		A
EAS	Single Pulse Avalanche Energy[3]	125		mJ
IAS	Avalanche Current	-50		A
P_D@T_C=25℃	Total Power Dissipation[4]	37		W
P_D@T_A=25℃	Total Power Dissipation[4]	4.2	1.67	W
TSTG	Storage Temperature Range	-55 to 150		℃
T_J	Operating Junction Temperature Range	-55 to 150		℃

-30V P-Channel Enhancement Mode MOSFET

$R_{\theta JA}$	Thermal Resistance Junction-Ambient [1]	75	℃/W
$R_{\theta JA}$	Thermal Resistance Junction-Ambient [1] (t ≤10s)	30	℃/W
$R_{\theta JC}$	Thermal Resistance Junction-Case[1]	3.36	℃/W

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

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V , I_D=-250uA	-30	---	---	V
$\triangle BV_{DSS}/\triangle T_J$	BVDSS Temperature Coefficient	Reference to 25℃ , I_D=-1mA	---	-0.0232	---	V/℃
$R_{DS(ON)}$	Static Drain-Source On-Resistance[2]	V_{GS}=-10V , I_D=-30A	---	11	13	mΩ
		V_{GS}=-4.5V , I_D=-15A	---	18	22	
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =-250uA	-1.2	-1.5	-2.5	V
$\triangle V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	4.6	---	mV/℃
I_{DSS}	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	
I_{GSS}	Gate-Source Leakage Current	V_{GS}=±20V , V_{DS}=0V	---	---	±100	nA
gfs	Forward Transconductance	V_{DS}=-5V , I_D=-30A	---	30	---	S
R_g	Gate Resistance	V_{DS}=0V , V_{GS}=0V , f=1MHz	---	9	---	Ω
Q_g	Total Gate Charge (-4.5V)	V_{DS}=-15V , V_{GS}=-4.5V , I_D=-15A	---	22	---	nC
Q_{gs}	Gate-Source Charge		---	8.7	---	
Q_{gd}	Gate-Drain Charge		---	7.2	---	
$T_{d(on)}$	Turn-On Delay Time	V_{DD}=-15V , V_{GS}=-10V , R_G=3.3 I_D=-15A	---	8	---	ns
T_r	Rise Time		---	73.7	---	
$T_{d(off)}$	Turn-Off Delay Time		---	61.8	---	
T_f	Fall Time		---	24.4	---	
C_{iss}	Input Capacitance	V_{DS}=-15V , V_{GS}=0V , f=1MHz	---	2215	---	pF
C_{oss}	Output Capacitance		---	310	---	
C_{rss}	Reverse Transfer Capacitance		---	237	---	
I_S	Continuous Source Current[1,5]	V_G=V_D=0V , Force Current	---	---	-42	A
I_{SM}	Pulsed Source Current[2,5]		---	---	-130	A
V_{SD}	Diode Forward Voltage[2]	V_{GS}=0V , I_S=-1A , T_J=25℃	---	---	-1	V
t_{rr}	Reverse Recovery Time	I_F=-15A , dI/dt=100A/μs , T_J=25℃	---	19	---	nS
Q_{rr}	Reverse Recovery Charge		---	9	---	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 V_{DD} =-25V V_{GS} =-10V,L=0.1mH,I_{AS}=-50A,

4.The power dissipation is limited by 150℃ 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.

Typical Characteristics

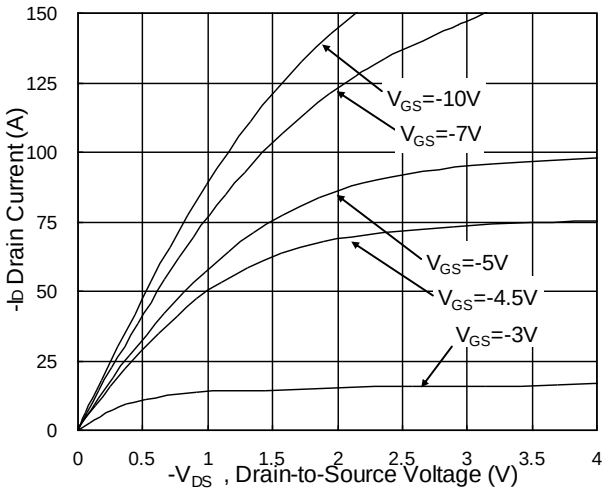


Fig.1 Typical Output Characteristics

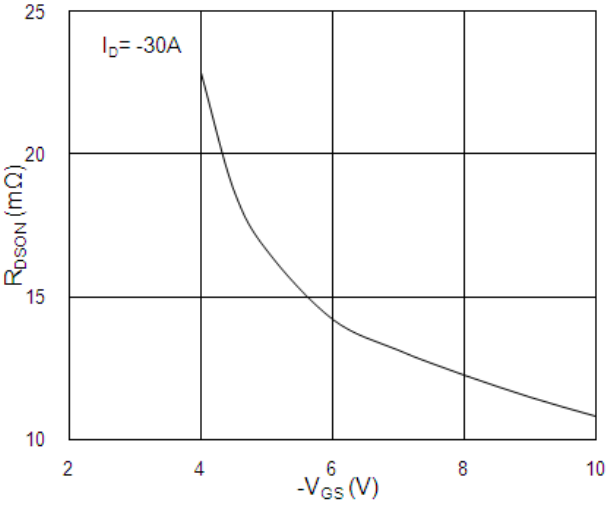


Fig.2 On-Resistance vs. G-S Voltage

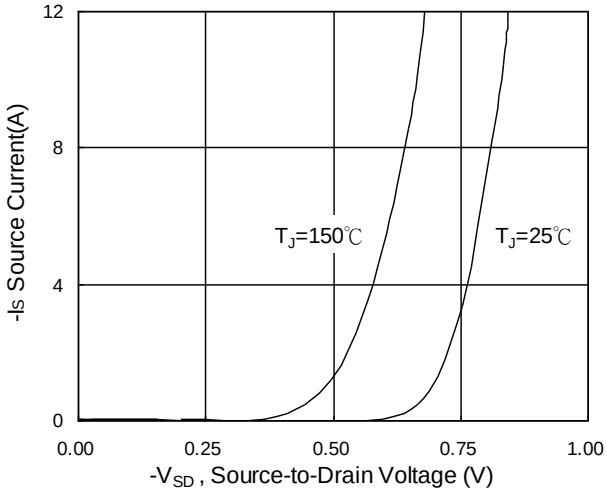


Fig.3 Forward Characteristics of Reverse

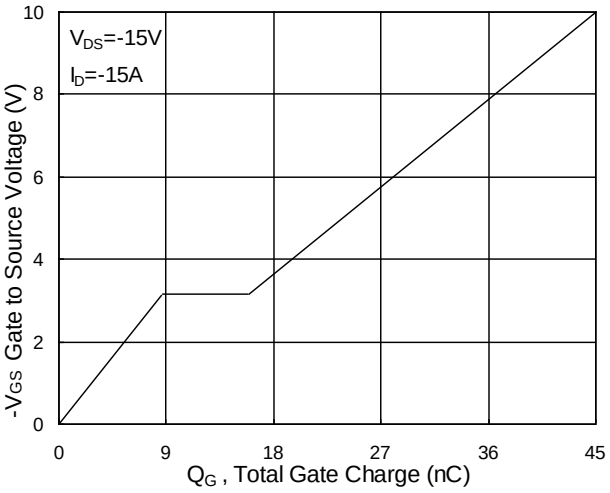


Fig.4 Gate-Charge Characteristics

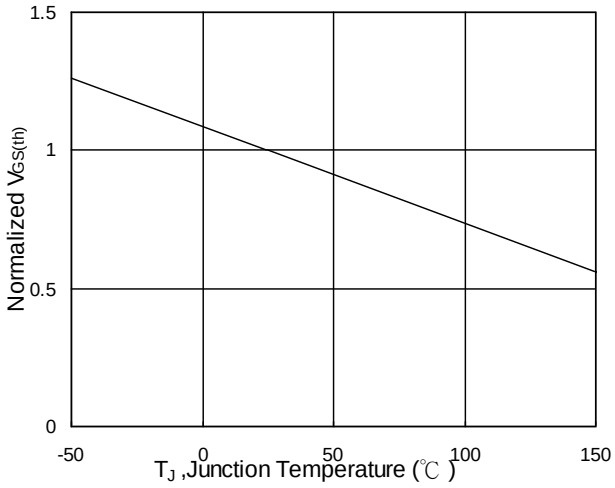


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

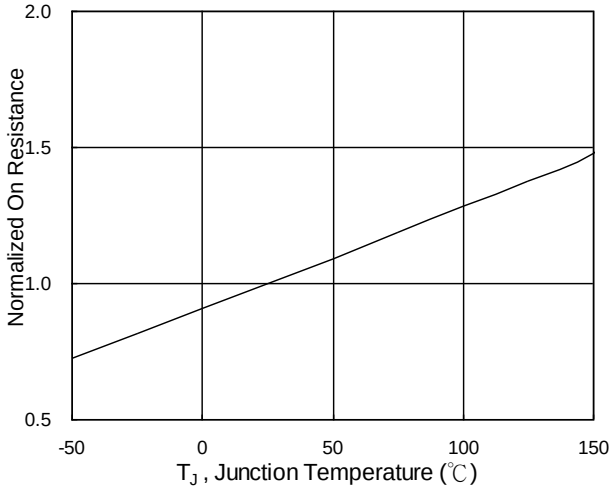


Fig.6 Normalized R_{DSON} vs. T_J

-30V P-Channel Enhancement Mode MOSFET

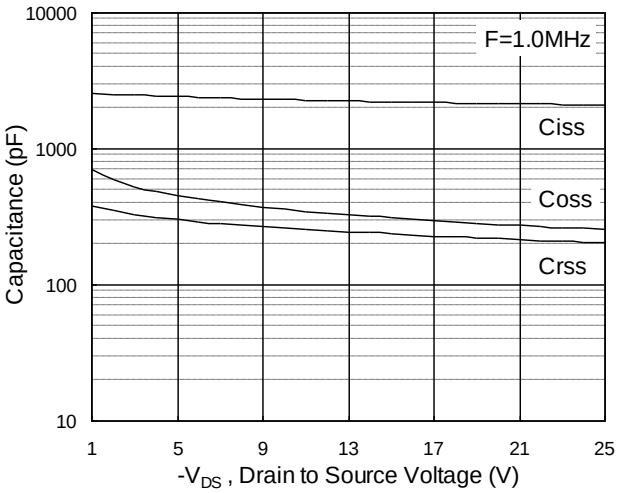


Fig.7 Capacitance

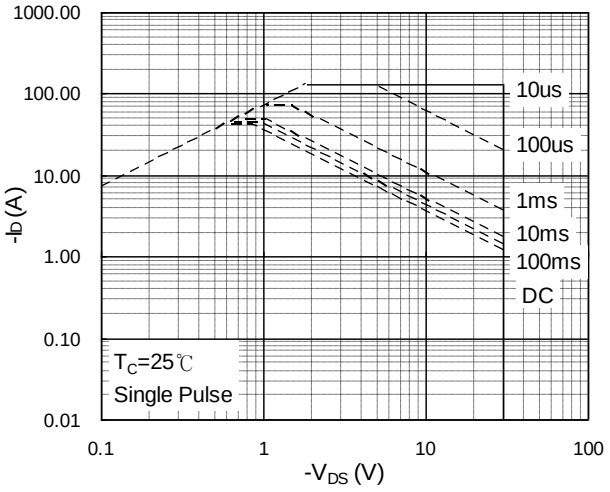


Fig.8 Safe Operating Area

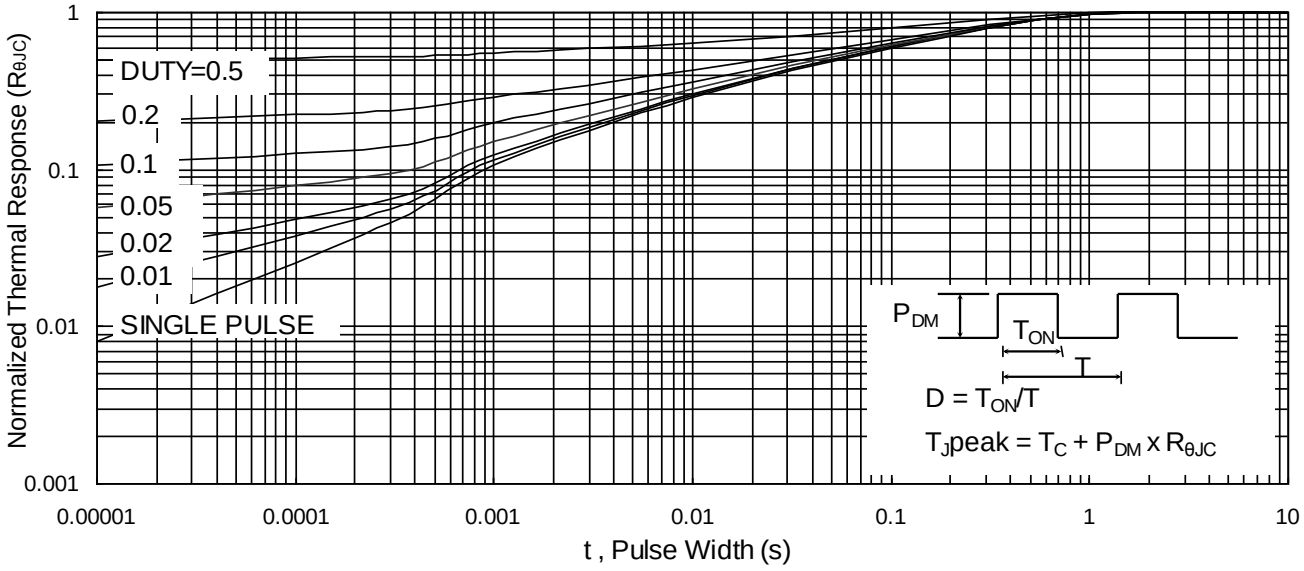


Fig.9 Normalized Maximum Transient Thermal Impedance

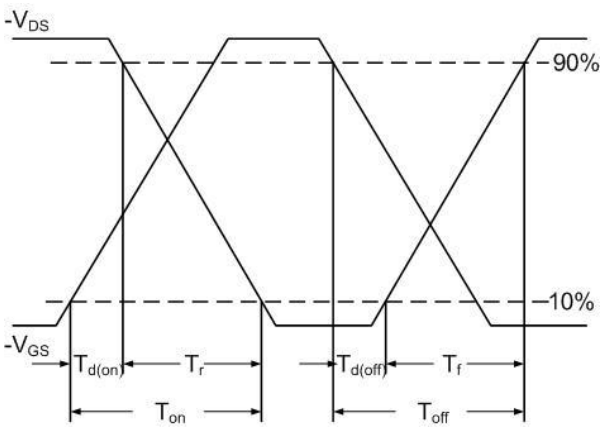


Fig.10 Switching Time Waveform

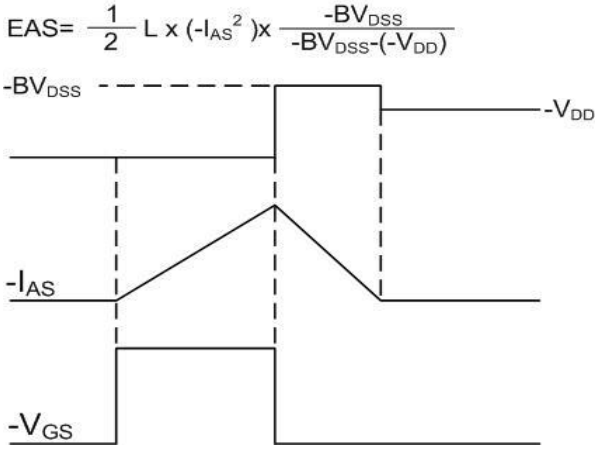
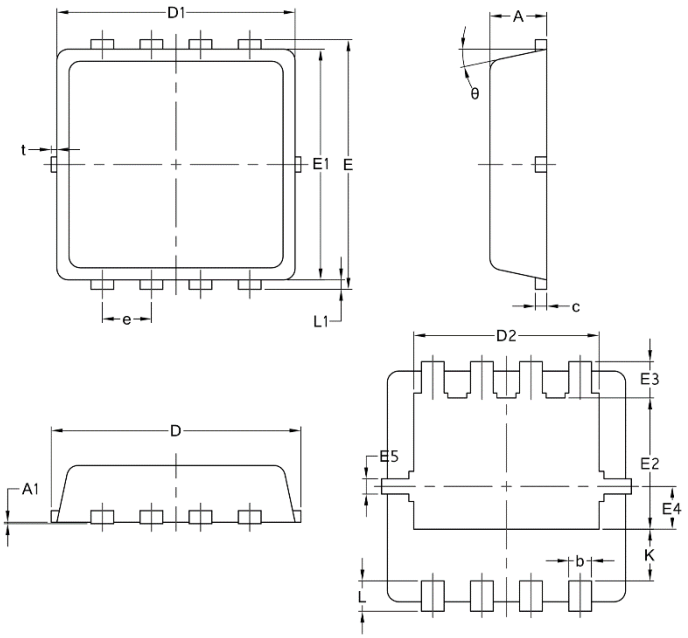


Fig.11 Unclamped Inductive Switching Waveform

Package Mechanical Data-DFN3*3-8L-JQ Single



Symbol	Common		
	mm		
	Mim	Nom	Max
A	0.70	0.75	0.85
A1	/	/	0.05
b	0.20	0.30	0.40
c	0.10	0.152	0.25
D	3.15	3.30	3.45
D1	3.00	3.15	3.25
D2	2.29	2.45	2.65
E	3.15	3.30	3.45
E1	2.90	3.05	3.20
E2	1.54	1.74	1.94
E3	0.28	0.48	0.65
E4	0.37	0.57	0.77
E5	0.10	0.20	0.30
e	0.60	0.65	0.70
K	0.59	0.69	0.89
L	0.30	0.40	0.50
L1	0.06	0.125	0.20
t	0	0.075	0.13
Φ	10	12	14

-30V P-Channel Enhancement Mode MOSFET

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