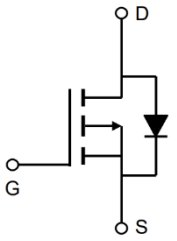
AP20P03DF

30V P-Channel Enhancement Mode MOSFET

Description

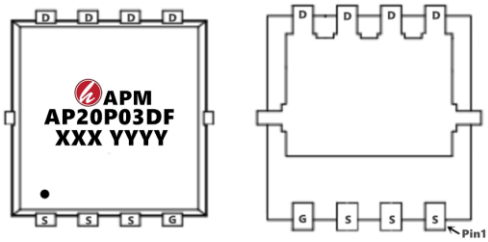
The AP20P03DF uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a Battery protection or in other Switching application.



General Features

V_{DS} = -30V I_D =-20A

$R_{DS(ON)}$ < 25mΩ @ V_{GS}=-10V



Application

Lithium battery protection

Wireless impact

Mobile phone fast charging

Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
AP20P03DF	PDFN3*3-8L	AP20P03DF XXX YYYY	5000

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

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	-30	V
V_{GS}	Gate-Source Voltage	±20	V
I_D@T_C=25℃	Continuous Drain Current, V_{GS} @ -10V[1]	-20	A
I_D@T_C=100℃	Continuous Drain Current, V_{GS} @ -10V[1]	-13	A
I_{DM}	Pulsed Drain Current[2]	-80	A
EAS	Single Pulse Avalanche Energy[3]	16	mJ
I_{AS}	Avalanche Current	-17	A
P_D@T_C=25℃	Total Power Dissipation[4]	16.6	W
P_D@T_A=25℃	Total Power Dissipation[4]	1.67	W
T_{STG}	Storage Temperature Range	-55 to 150	℃
T_J	Operating Junction Temperature Range	-55 to 150	℃
$R_{\theta JA}$	Thermal Resistance Junction-Ambient [1]	7.53	℃/W

Electrical Characteristics (T_C=25℃unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BVDSS	Drain-Source Breakdown Voltage	V_{GS}=0V , I_D=-250uA	-30	32	---	V
△BVDSS/△TJ	BV_{DSS} Temperature Coefficient	Reference to 25℃ , I_D=-1mA	---	-0.022	---	V/℃
RDS(ON)	Static Drain-Source On-Resistance	V_{GS}=-10V , I_D=-10A	---	18.8	25	mΩ
		V_{GS}=-4.5V , I_D=-5A	---	30.5	40	
VGS(th)	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =-250uA	-1.2	-1.7	-2.5	V
△$V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	4.6	---	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
R_g	Gate Resistance	V_{DS}=0V , V_{GS}=0V , f=1MHz	---	8.9	---	Ω
Q_g	Total Gate Charge (-4.5V)	V_{DS}=-15V , V_{GS}=-4.5V , I_D=-15A	---	19	---	nC
Qgs	Gate-Source Charge		---	6.3	---	
Qgd	Gate-Drain Charge		---	4.5	---	
Td(on)	Turn-On Delay Time	V_{DD}=-15V, V_{GS}=-10V , R_G=3.3Ω, I_D=-15A	---	6	---	ns
T_r	Rise Time		---	5	---	
Td(off)	Turn-Off Delay Time		---	25	---	
T_f	Fall Time		---	7	---	
Ciss	Input Capacitance	V_{DS}=-15V , V_{GS}=0V , f=1MHz	---	900	---	pF
Coss	Output Capacitance		---	140	---	
Crss	Reverse Transfer Capacitance		---	120	---	
IS	Continuous Source Current	V_G=V_D=0V , Force Current	---	---	-20	A
ISM	Pulsed Source Current		---	---	-80	A
VSD	Diode Forward Voltage	V_{GS}=0V , I_S=-1A , T_J=25℃	---	---	-1.2	V
trr	Reverse Recovery Time	IF=-15A , dI/dt=100A/μs , T_J=25℃	---	7	---	nS
Q_{rr}	Reverse Recovery Charge		---	6.3	---	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}=-24V,V_{GS}=-10V,L=0.1mH,I_{AS}=-17A
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

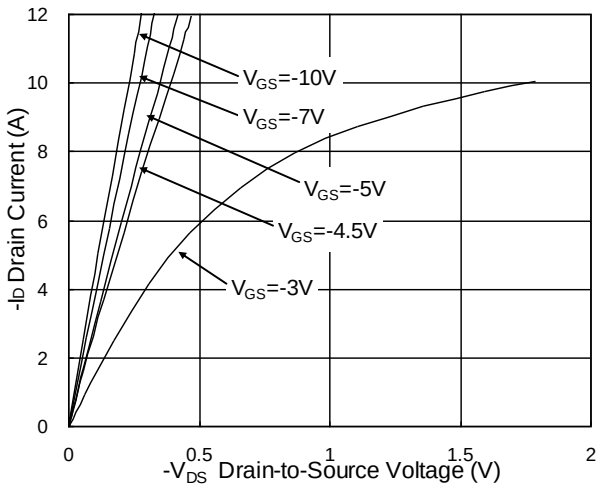


Fig.1 Typical Output Characteristics

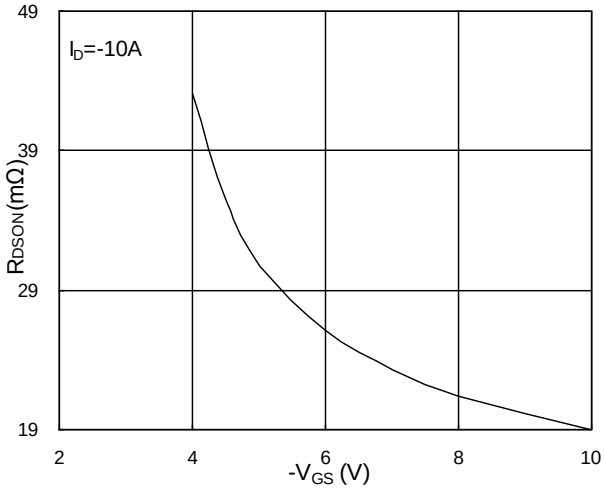


Fig.2 On-Resistance v.s Gate-Source

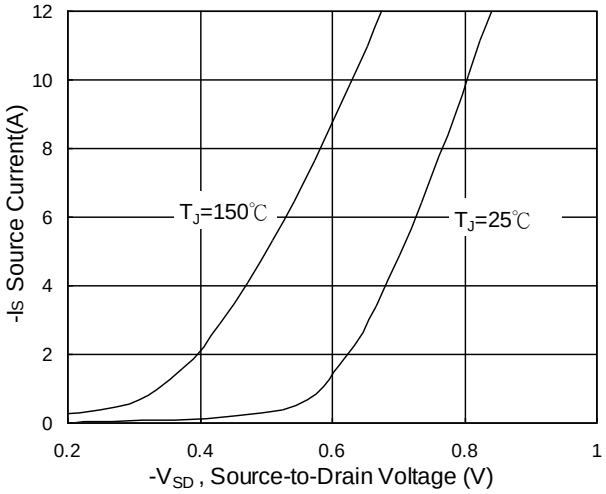


Fig.3 Forward Characteristics of Reverse

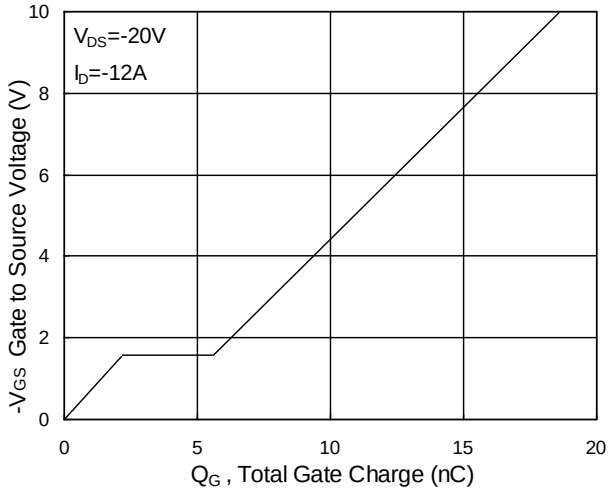


Fig.4 Gate-Charge Characteristics

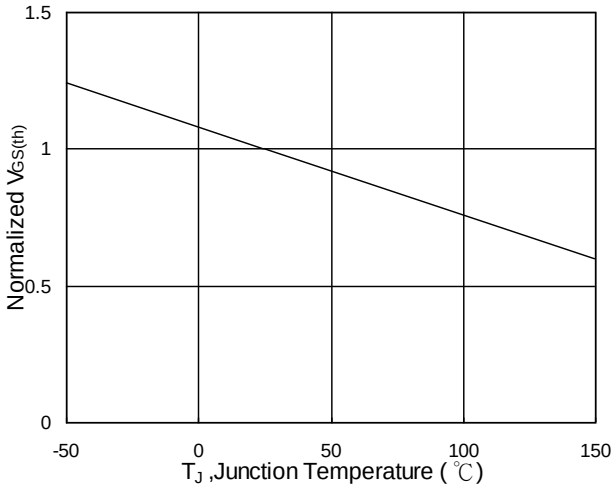


Fig.5 Normalized $V_{GS(th)}$ v.s T_J

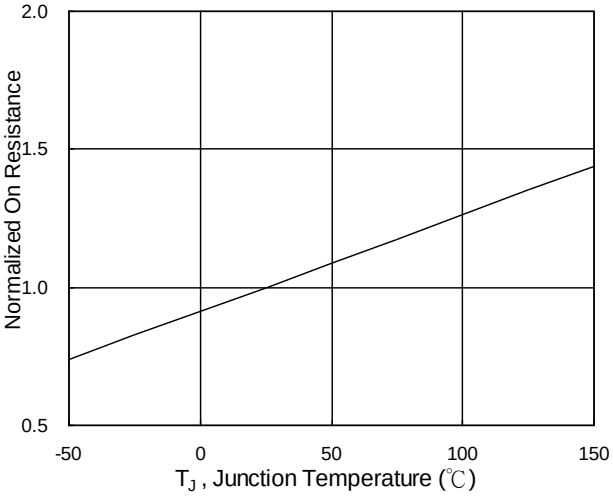


Fig.6 Normalized R_{DSON} v.s T_J

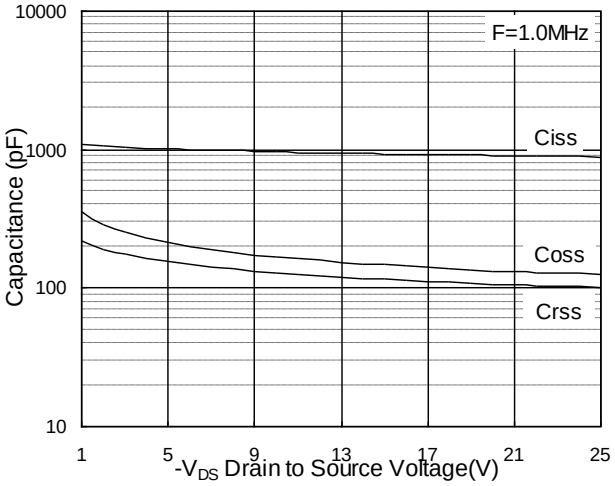


Fig.7 Capacitance

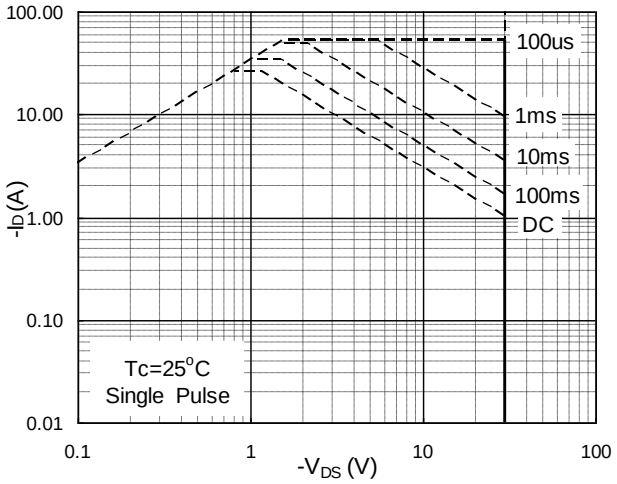


Fig.8 Safe Operating Area

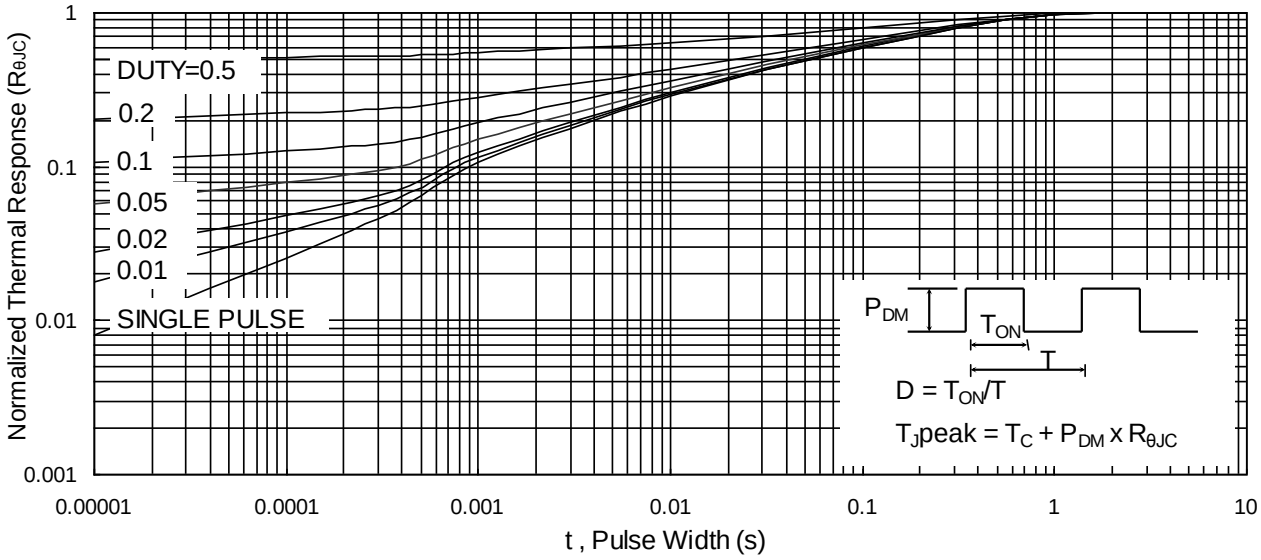


Fig.9 Normalized Maximum Transient Thermal Impedance

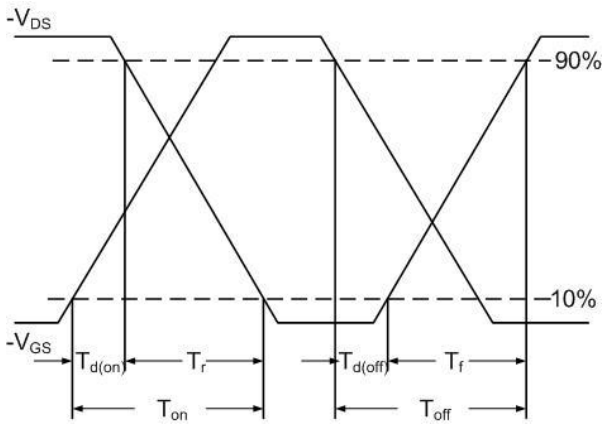


Fig.10 Switching Time Waveform

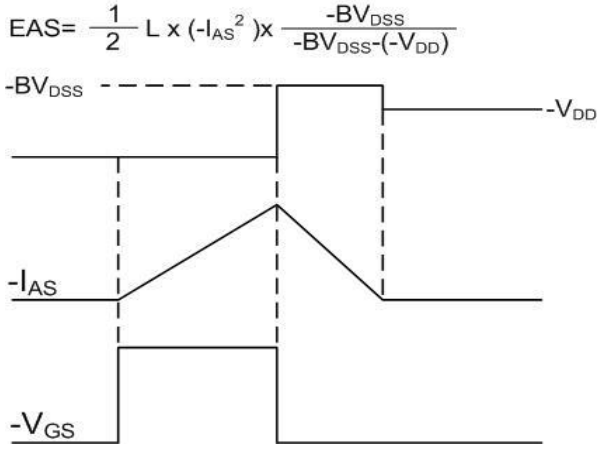
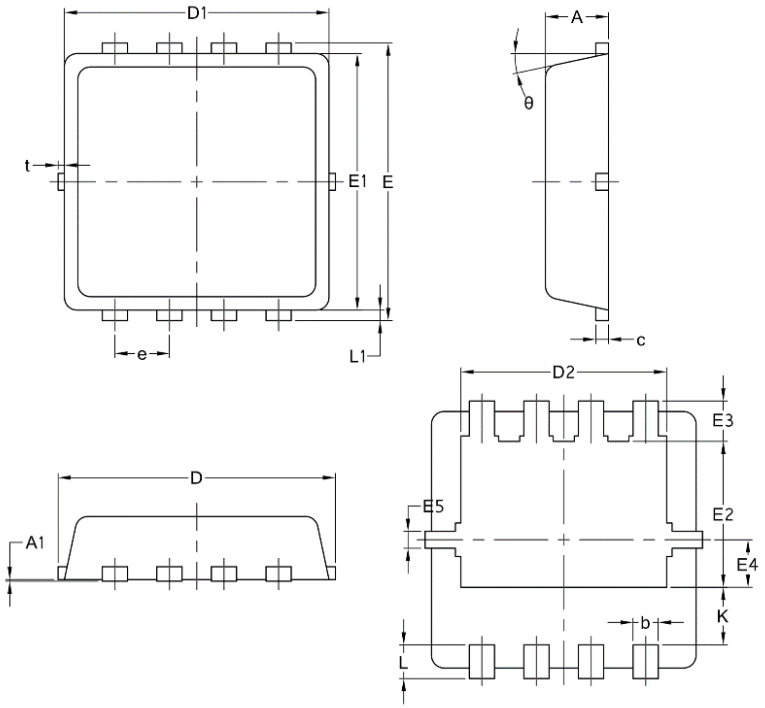


Fig.11 Unclamped Inductive Switching Waveform

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



Symbol	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

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Edition	Date	Change
Rve1.0	2018/4/10	Initial release