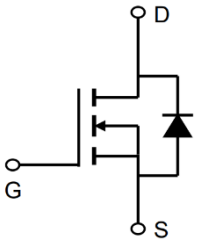
AP90N02NF

20V N-Channel Enhancement Mode MOSFET

Description

The AP90N02NF uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a Battery protection or in other Switching application.

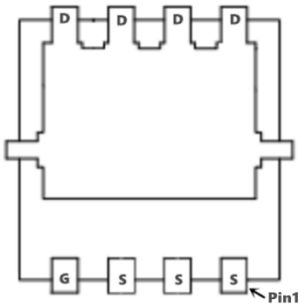


General Features

V_{DS} = 20V I_D =90A

$R_{DS(ON)}$ < 2.0mΩ@ V_{GS}=10V **(Type：1.6mΩ)**

$R_{DS(ON)}$ < 2.5mΩ@ V_{GS}=4.5V **(Type：1.9mΩ)**

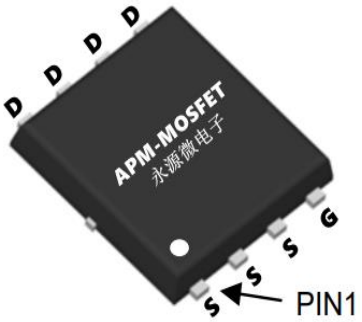


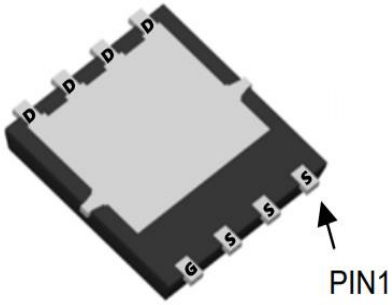
Application

Battery protection

Load switch

Uninterruptible power supply





Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
AP90N02NF	PDFN5*6-8L	AP90N02NF XXX YYYY	5000

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

Symbol	Parameter	Max.	Units
VDSS	Drain-Source Voltage	20	V
VGSS	Gate-Source Voltage	±12	V
I_D@T_C=25℃	Continuous Drain Current, V_{GS} @ 10V[1]	90	A
I_D@T_C=100℃	Continuous Drain Current, V_{GS} @ 10V[1]	48	A
IDM	Pulsed Drain Current note1	270	A
EAS	Single Pulsed Avalanche Energy note2	80	mJ
IAS	Avalanche Current	40	A
P_D	Power Dissipation	83	W
RθJA	Thermal Resistance Junction-ambient	25	℃/W
RθJC	Thermal Resistance, Junction to Case	1.5	℃/W
TJ, TSTG	Operating and Storage Temperature Range	-55 to +175	℃

20V N-Channel Enhancement Mode MOSFET

Electrical Characteristics (T_C=25℃unless otherwise noted)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
V(BR)DSS	Drain-Source Breakdown Voltage	V_{GS}=0V, I_D=250μA	20	22	-	V
IDSS	Zero Gate Voltage Drain Current	V_{DS}=20V, V_{GS}=0V	-	-	1	μA
IGSS	Gate to Body Leakage Current	V_{GS}= ±12V, V_{DS}=0V	-	-	±100	nA
VGS(th)	Gate Threshold Voltage	V_{DS}=V_{GS}, I_D=250μA	0.5	0.68	1.0	V
RDS(on)	Static Drain-Source On-Resistance	V_{GS}=10V, I_D=20A		1.6	2.0	mΩ
RDS(on)	Static Drain-Source On-Resistance	V_{GS}=4.5V, I_D=20A	-	1.9	2.5	mΩ
RDS(on)	Static Drain-Source On-Resistance	V_{GS}=3.8V, I_D=20A		2.5	3.2	mΩ
RDS(on)	Static Drain-Source On-Resistance	V_{GS}=2.5V, I_D=20A		3.2	4.0	mΩ
C_{iss}	Input Capacitance	V_{DS}=10V, V_{GS}=0V, f=1.0MHz	-	4307	-	pF
Coss	Output Capacitance		-	501	-	pF
Crss	Reverse Transfer Capacitance		-	321	-	pF
Q_g	Total Gate Charge	V_{DS}=10V, I_D=30A, V_{GS}=4.5V	-	48	-	nC
Q_{gs}	Gate-Source Charge		-	3.6	-	nC
Q_{gd}	Gate-Drain(“Miller”) Charge		-	19	-	nC
td(on)	Turn-On Delay Time	V_{DS} =10V, I_D=30A, R_G=1.8Ω, V_{GS}=4.5V	-	9.7	-	ns
t_r	Turn-On Rise Time		-	37	-	ns
td(off)	Turn-Off Delay Time		-	63	-	ns
t_f	Turn-Off Fall Time		-	52	-	ns
IS	Maximum Continuous Drain to Source Diode Forward Current		-	-	120	A
ISM	Maximum Pulsed Drain to Source Diode Forward Current		-	-	360	A
VSD	Drain to Source Diode Forward Voltage	V_{GS}=0V, I_{SD}=30A, T_J=25℃	-	-	1.2	V
t_{rr}	Reverse Recovery Time	T_J=25°C, I_F=30A, di/dt =100A/μs	-	23	-	ns
Q_{rr}	Reverse Recovery Charge		-	10	-	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 .The EAS data shows Max. rating .
3、The EAS condition: T_J=25℃, V_{DD}=16V, V_G=4.5V, R_G=25Ω, L=0.1mH, I_{AS}=55A
4、The power dissipation is limited by 175℃ junction temperature
5、The data is theoretically the same as ID and IDM , in real applications , should be limited by total power dissipation.

Typical Characteristics

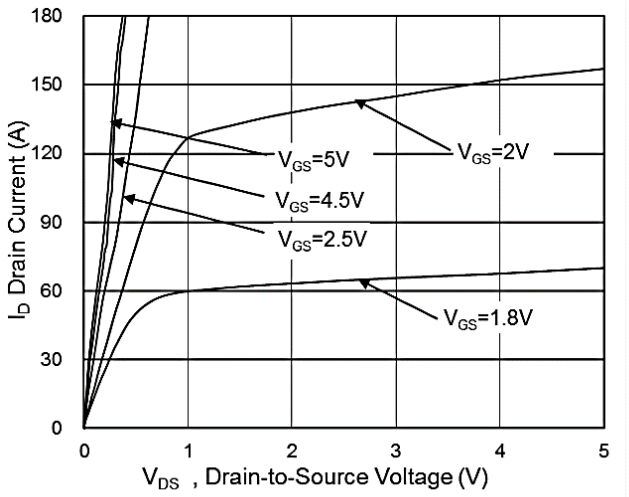


Fig.1 Typical Output Characteristics

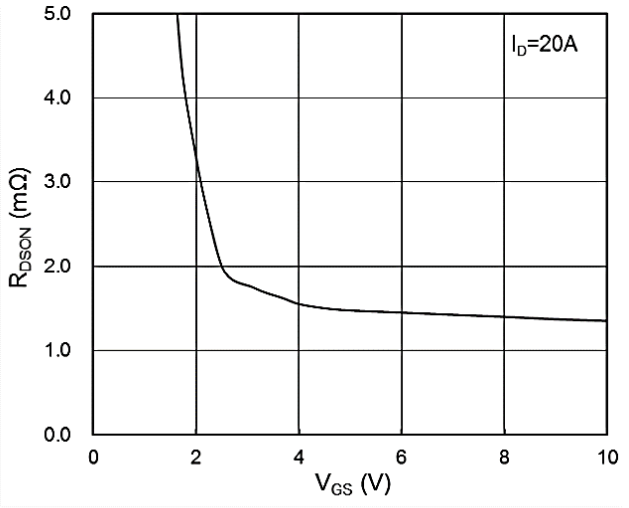


Fig.2 On-Resistance vs. Gate-Source Voltage

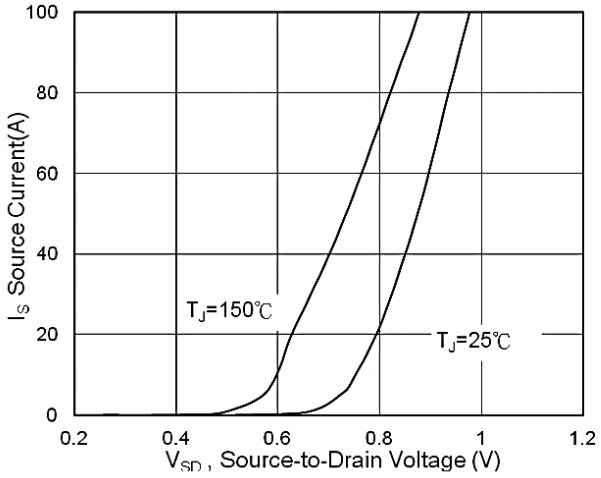


Fig.3 Forward Characteristics of Reverse

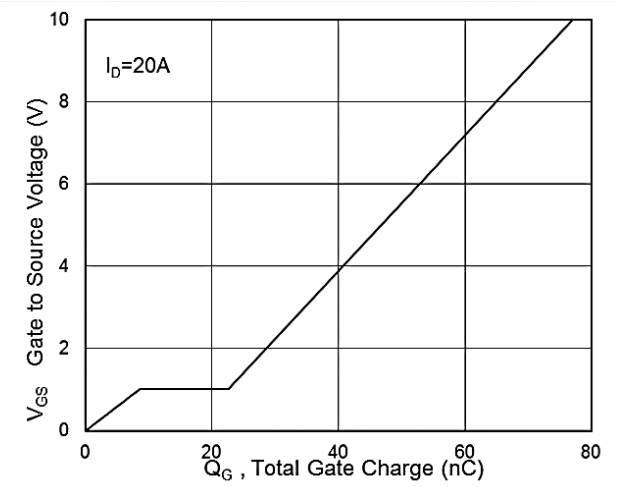


Fig.4 Gate-Charge Characteristics

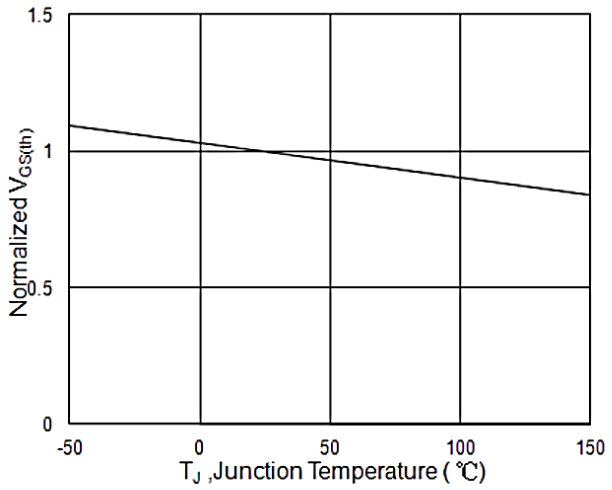


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

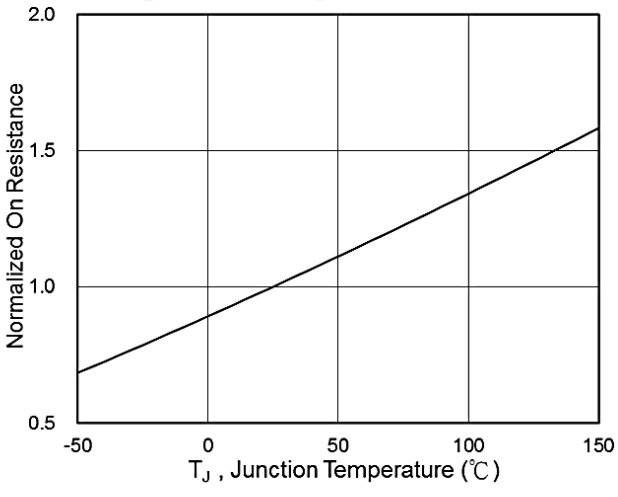


Fig.6 Normalized R_{DSON} vs. T_J

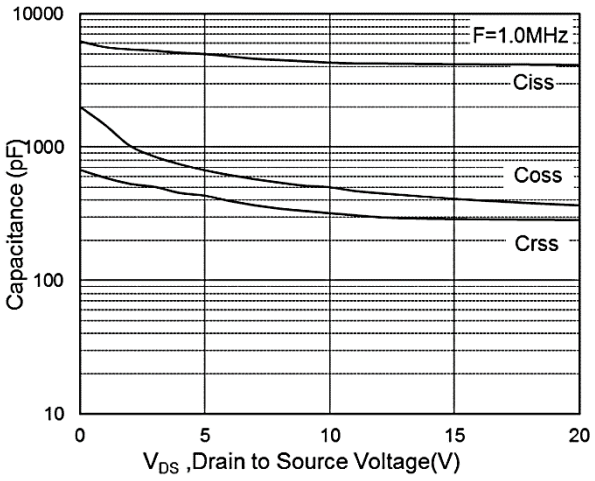


Fig.7 Capacitance

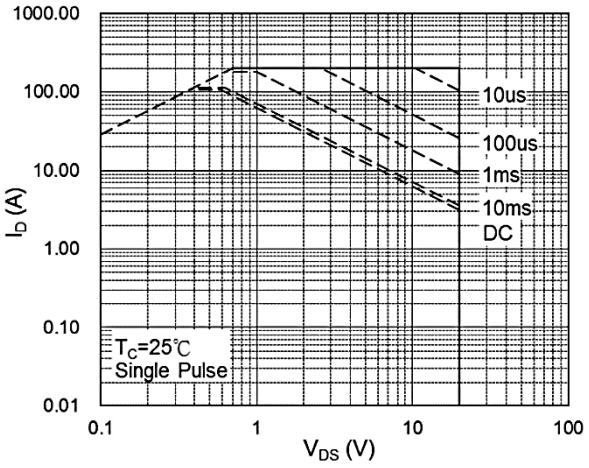


Fig.8 Safe Operating Area

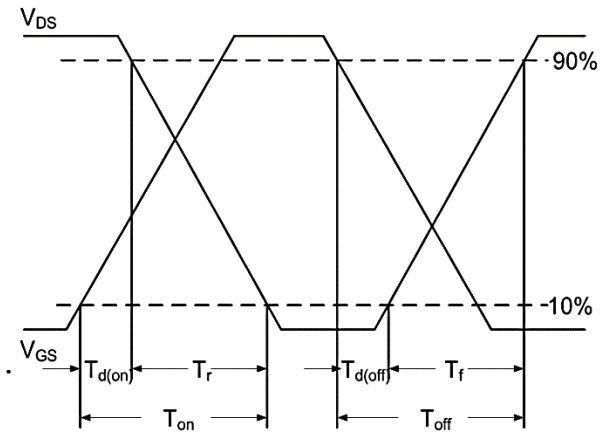


Fig.10 Switching Time Waveform

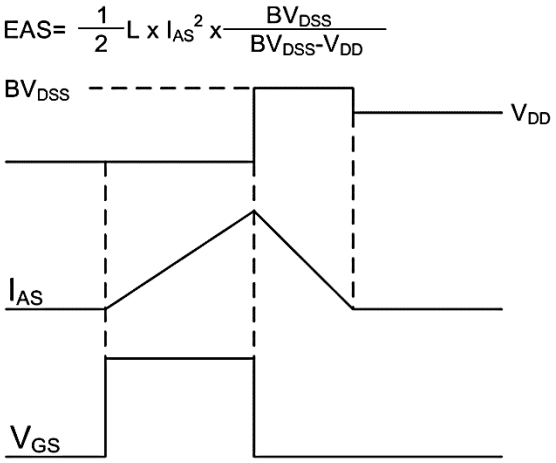


Fig.11 Unclamped Inductive Switching Waveform

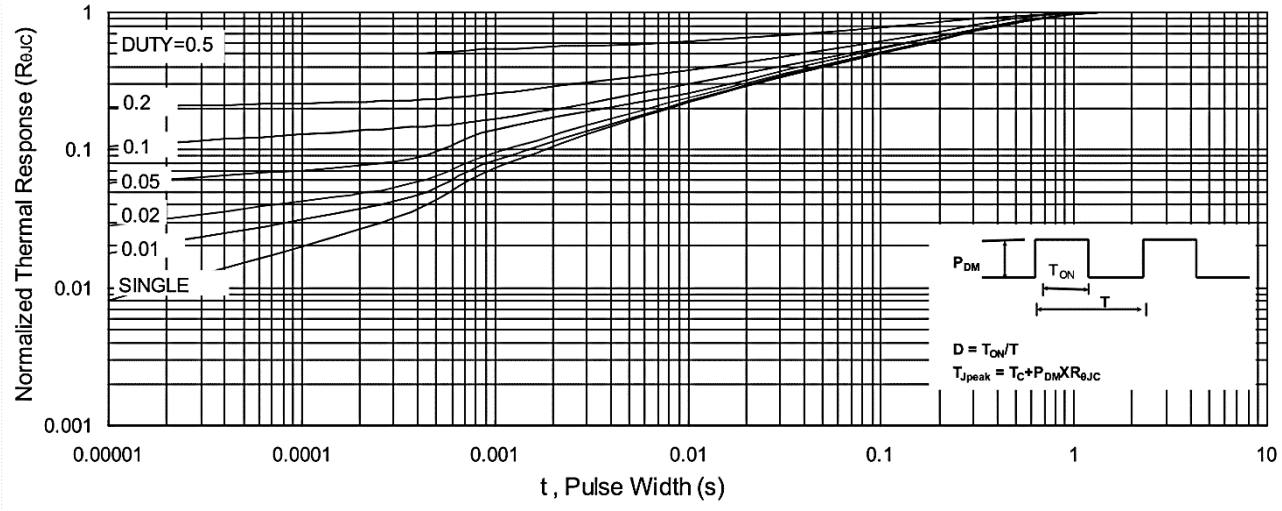
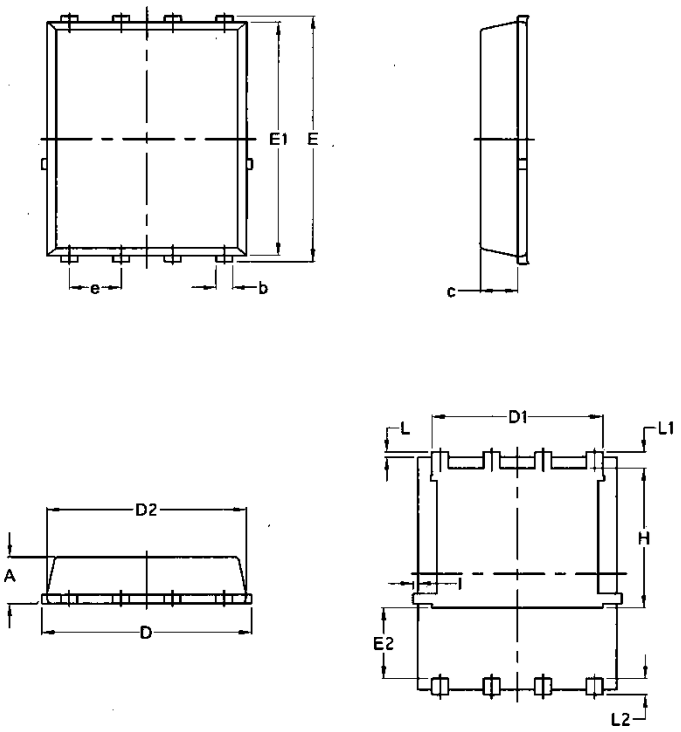


Fig.9 Normalized Maximum Transient Thermal Impedance

Package Mechanical Data-DFN5*6-8L-JQ Single



Symbol	Common			
	mm		Inch	
	Mim	Max	Min	Max
A	1.03	1.17	0.0406	0.0461
b	0.34	0.48	0.0134	0.0189
c	0.824	0.0970	0.0324	0.082
D	4.80	5.40	0.1890	0.2126
D1	4.11	4.31	0.1618	0.1697
D2	4.80	5.00	0.1890	0.1969
E	5.95	6.15	0.2343	0.2421
E1	5.65	5.85	0.2224	0.2303
E2	1.60	/	0.0630	/
e	1.27 BSC		0.05 BSC	
L	0.05	0.25	0.0020	0.0098
L1	0.38	0.50	0.0150	0.0197
L2	0.38	0.50	0.0150	0.0197
H	3.30	3.50	0.1299	0.1378
I	/	0.18	/	0.0070

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Edition	Date	Change
Rve1.0	2021/8/31	Initial release