

## 30V N-Channel Enhancement Mode MOSFET

### Description

The AP120N03BNF 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

$V_{DS} = 30V$   $I_D = 120A$

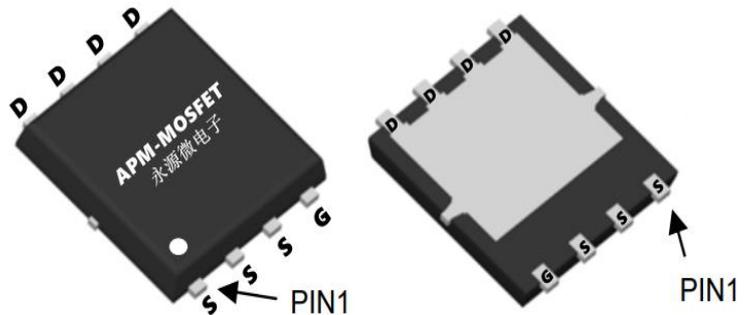
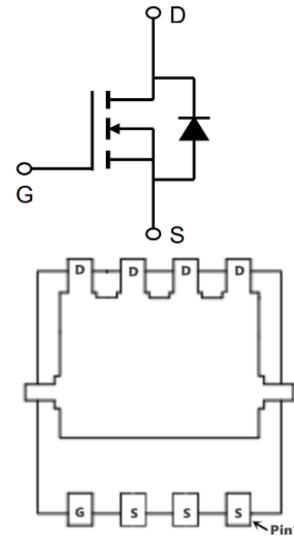
$R_{DS(ON)} < 3.8m\Omega$  @  $V_{GS}=10V$  (Type: 2.8m $\Omega$ )

### Application

Battery protection

Load switch

Uninterruptible power supply



### Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
AP120N03BNF	PDFN5X6-8L	AP120N03BNF XXX YYYYY	5000

### Absolute Maximum Ratings ( $T_C=25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	30	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D@T_C=25^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10V^1$	120	A
$I_D@T_C=100^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10V^1$	84	A
IDM	Pulsed Drain Current <sup>2</sup>	480	A
EAS	Single Pulse Avalanche Energy <sup>3</sup>	355	mJ
IAS	Avalanche Current	36	A
$P_D@T_C=25^\circ\text{C}$	Total Power Dissipation <sup>4</sup>	59	W
TSTG	Storage Temperature Range	-55 to 150	$^\circ\text{C}$
$T_J$	Operating Junction Temperature Range	-55 to 150	$^\circ\text{C}$
$R_{\theta JC}$	Thermal Resistance Junction-Case <sup>1</sup>	2.1	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance Junction-Ambient <sup>1</sup>	62.5	$^\circ\text{C}/\text{W}$

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### Electrical Characteristics ( $T_J=25^\circ\text{C}$ , unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BVDSS	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	30	34	-	V
RDS(ON)	Static Drain-Source On-Resistance	$V_{GS}=10V, I_D=30A$	-	2.8	3.8	m $\Omega$
		$V_{GS}=4.5V, I_D=15A$	-	4.7	5.8	
VGS(th)	Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=250\mu A$	1.2	1.5	2.5	V
IDSS	Drain-Source Leakage Current	$V_{DS}=30V, V_{GS}=0V, T_J=25^\circ\text{C}$	-	-	1	uA
		$V_{DS}=30V, V_{GS}=0V, T_J=55^\circ\text{C}$	-	-	5	
IGSS	Gate-Source Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	$\pm 100$	nA
gfs	Forward Transconductance	$V_{DS}=5V, I_D=30A$	-	22	-	S
Rg	Gate Resistance	$V_{DS}=15V, V_{GS}=0V, f=1\text{MHz}$	-	1.7	-	$\Omega$
Ciss	Input Capacitance		-	2320	-	
Coss	Output Capacitance		-	293	-	
Crss	Reverse Transfer Capacitance		-	307	-	
Qg	Total Gate Charge (4.5V)	$V_{DS}=15V, V_{GS}=4.5V, I_D=15A$	-	20	-	nC
Qgs	Gate-Source Charge		-	7.6	-	
Qgd	Gate-Drain Charge		-	7.2	-	
Td(on)	Turn-On Delay Time	$V_{DD}=15V, V_{GS}=10V, R_G=3.3\Omega, I_D=15A$	-	7.8	-	ns
Tr	Rise Time		-	15	-	
Td(off)	Turn-Off Delay Time		-	37.3	-	
Tf	Fall Time		-	10.6	-	
Is	Continuous Source Current <sup>1,5</sup>	$V_G=V_D=0V$ , Force Current	-	-	100	A
ISM	Pulsed Source Current <sup>2,5</sup>		-	-	480	A
VSD	Diode Forward Voltage <sup>2</sup>	$V_{GS}=0V, I_S=1A, T_J=25^\circ\text{C}$	-	-	1	V
t <sub>rr</sub>	Reverse Recovery Time	$I_F=30A, dI/dt=100A/\mu s, T_J=25^\circ\text{C}$	-	14	-	nS
Q <sub>rr</sub>	Reverse Recovery Charge		-	5	-	nC

**Note :**

- 1、 The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper.
- 2、 The data tested by pulsed , pulse width  $\leq 300\mu s$  , duty cycle  $\leq 2\%$
- 3、 The EAS data shows Max. rating . The test condition is  $V_{DD}=24V, V_{GS}=10V, L=0.1mH, I_{AS}=36A$
- 4、 The power dissipation is limited by  $175^\circ\text{C}$  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

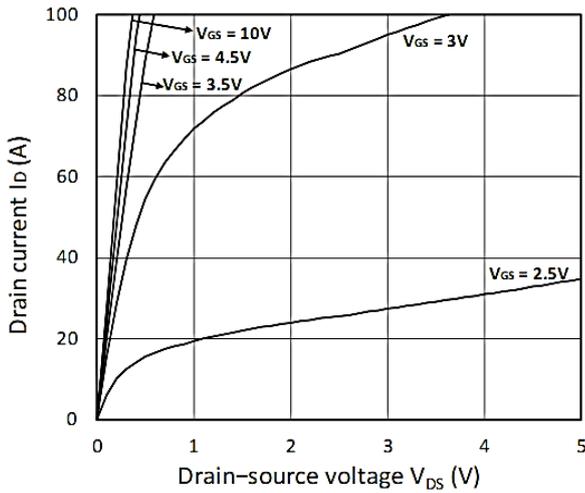


Figure 1. Output Characteristics

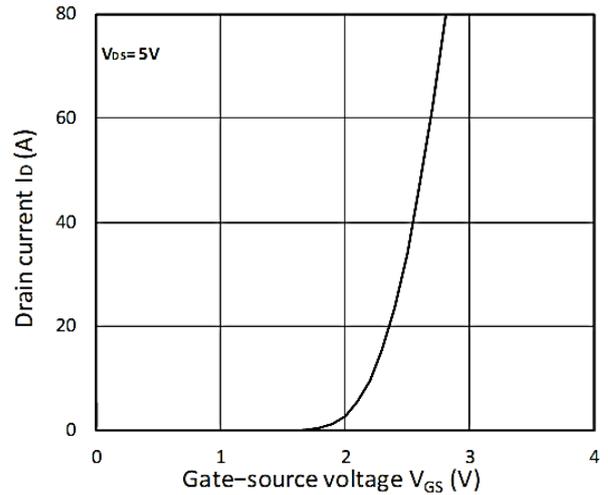


Figure 2. Transfer Characteristics

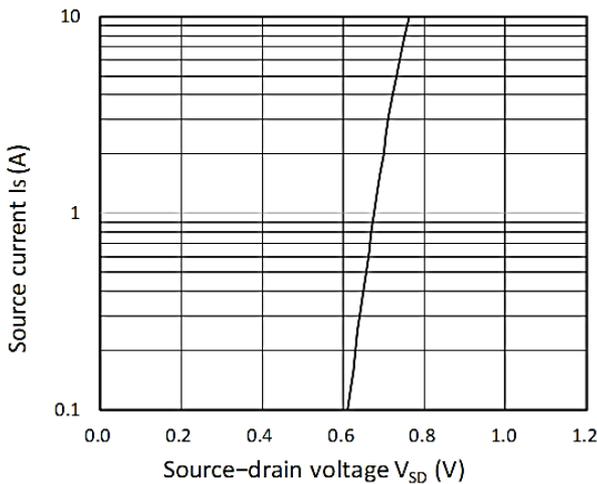


Figure 3. Forward Characteristics of Reverse

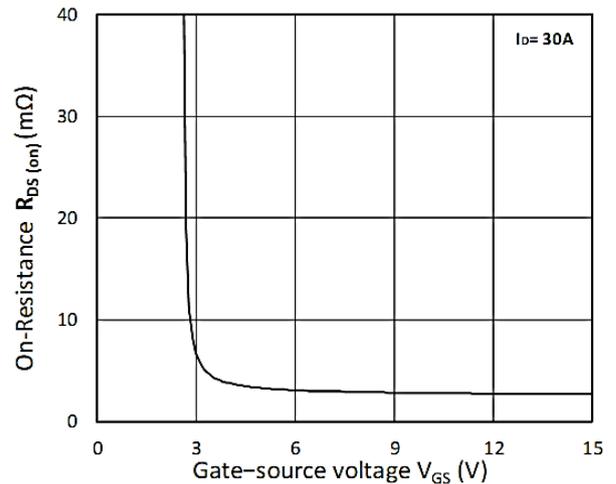


Figure 4. RDS(ON) vs. VGS

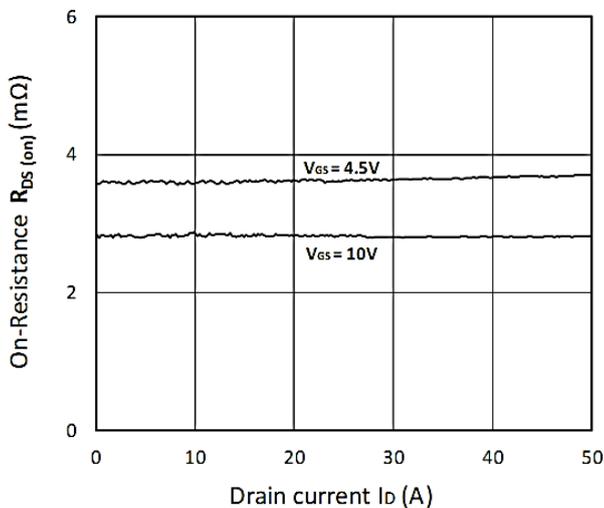


Figure 5. RDS(ON) vs. ID

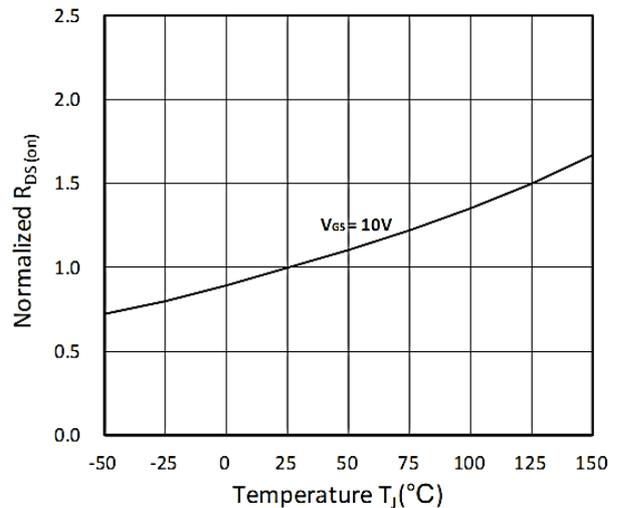


Figure 6. Normalized RDS(on) vs. Temperature

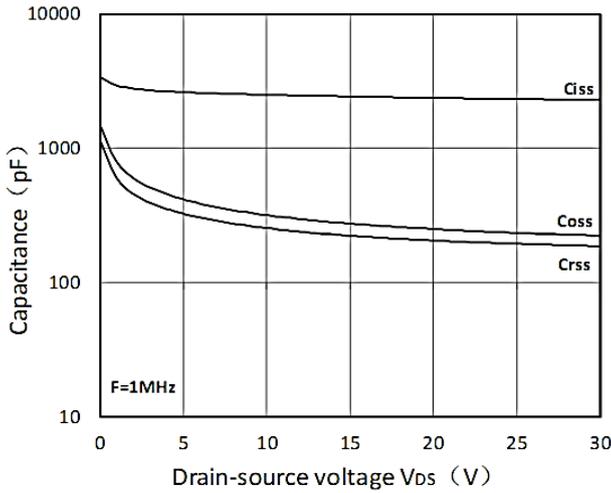


Figure 7. Capacitance Characteristics

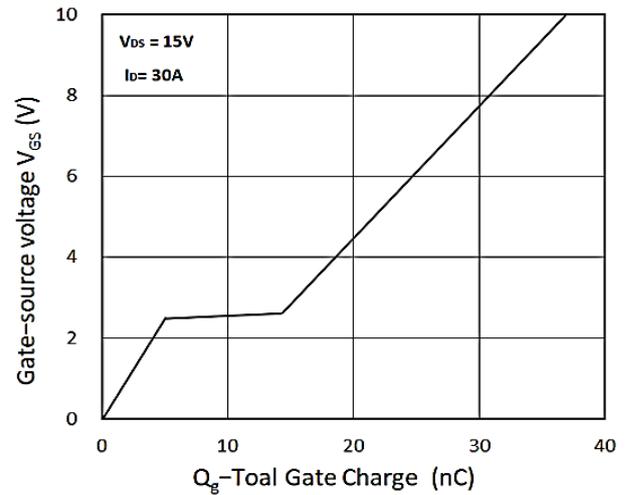


Figure 8. Gate Charge Characteristics

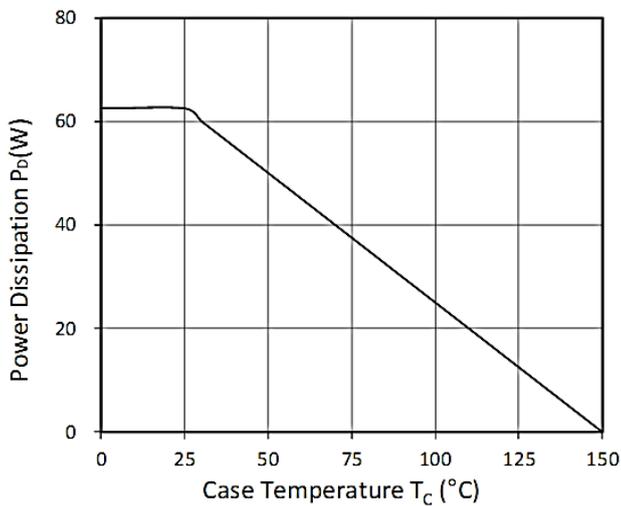


Figure 9. Power Dissipation

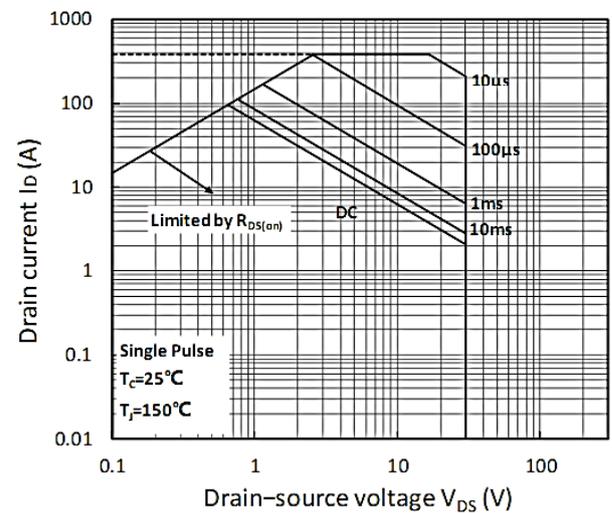


Figure 10. Safe Operating Area

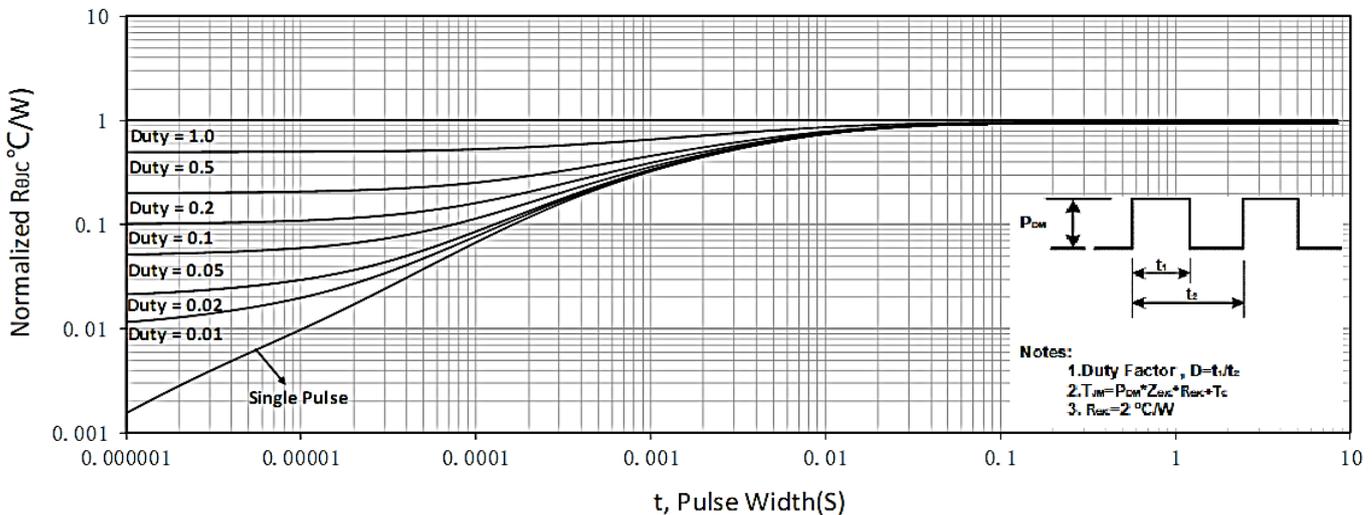
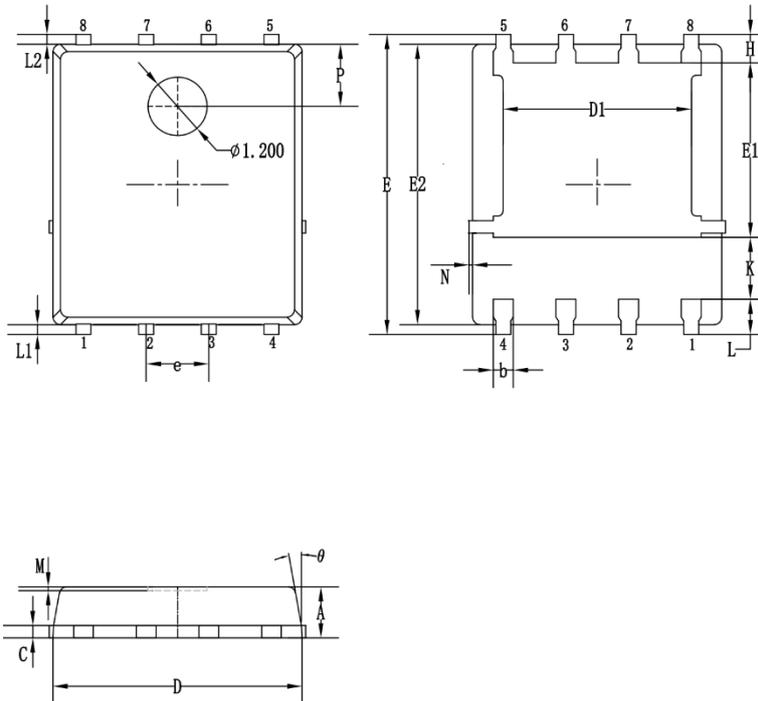


Figure 11. Normalized Maximum Transient Thermal Impedance

### Package Mechanical Data-PDFN5\*6-8L



Symbol	Dim in mm		
	Min	Typ	Max
A	0.9	1.05	1.2
b	0.3	0.4	0.5
C	0.2	0.25	0.35
D	4.9	5.05	5.2
D1	3.72	3.82	4.12
E	5.9	6.1	6.3
E1	3.3	3.5	3.7
E2	5.6	5.75	5.9
e	1.27BSC		
H	0.48	0.58	0.7
K	1.14	1.27	1.4
L	0.54	0.74	0.84
L1/L2	0.1	0.2	0.3
$\theta$	8°	10°	12°
M	0.08REF		
N	0		0.15
P	1.28REF		

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Edition	Date	Change
REV1.0	2024/1/31	Initial release

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