

30V N+N-Channel Enhancement Mode MOSFET

Description

The AP20H03NF 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

$V_{DS} = 30V$ $I_D = 24.7A$

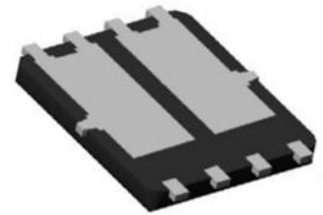
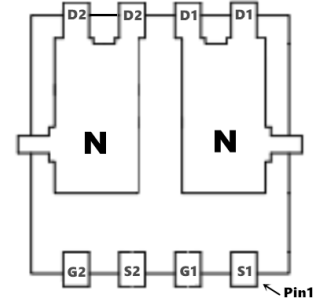
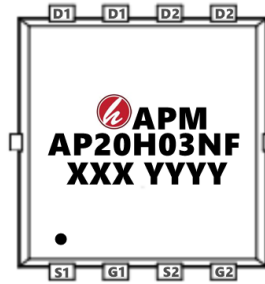
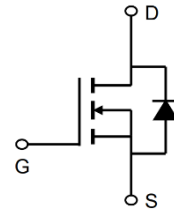
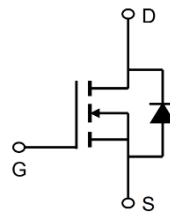
$R_{DS(ON)} < 12m\Omega$ @ $V_{GS}=10V$ (Type: 8.5m Ω)

Application

Lithium battery protection

Wireless impact

Mobile phone fast charging



Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
AP20H03NF	PDFN5*6-8L	AP20H03NF XXX YYYY	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	± 20	V
$I_D@T_C=25^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10V^1$	24.7	A
$I_D@T_C=100^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10V^1$	10.6	A
IDM	Pulsed Drain Current ²	92	A
EAS	Single Pulse Avalanche Energy ³	57.8	mJ
IAS	Avalanche Current	13	A
$P_D@T_C=25^\circ\text{C}$	Total Power Dissipation ⁴	19.2	W
$P_D@T_A=25^\circ\text{C}$	Total Power Dissipation ⁴	1.42	W
TSTG	Storage Temperature Range	-55 to 150	$^\circ\text{C}$
T_J	Operating Junction Temperature Range	-55 to 150	$^\circ\text{C}$
$R_{\theta JA}$	Thermal Resistance Junction-Ambient ¹	62	$^\circ\text{C/W}$
$R_{\theta JC}$	Thermal Resistance Junction-Case ¹	6.5	$^\circ\text{C/W}$



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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	33	---	V
$\Delta BVDSS/\Delta T_J$	BVDSS Temperature Coefficient	Reference to 25°C , $I_D=1\text{mA}$	---	0.023	---	$V/^\circ\text{C}$
RDS(ON)	Static Drain-Source On-Resistance ²	$V_{GS}=10V, I_D=15A$	---	8.5	12	m Ω
		$V_{GS}=4.5V, I_D=10A$	---	11.5	16.5	
VGS(th)	Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=250\mu A$	1.0	---	2.5	V
$\Delta V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	-5.08	---	mV/ $^\circ\text{C}$
IDSS	Drain-Source Leakage Current	$V_{DS}=24V, V_{GS}=0V, T_J=25^\circ\text{C}$	---	---	1	μA
		$V_{DS}=24V, V_{GS}=0V, T_J=55^\circ\text{C}$	---	---	5	
IGSS	Gate-Source Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	---	---	± 100	nA
gfs	Forward Transconductance	$V_{DS}=5V, I_D=15A$	---	24.4	---	S
Rg	Gate Resistance	$V_{DS}=0V, V_{GS}=0V, f=1\text{MHz}$	---	1.8	---	Ω
Qg	Total Gate Charge (4.5V)	$V_{DS}=15V, V_{GS}=4.5V, I_D=12A$	---	9.82	---	nC
Qgs	Gate-Source Charge		---	2.24	---	
Qgd	Gate-Drain Charge		---	5.54	---	
Td(on)	Turn-On Delay Time	$V_{DD}=15V, V_{GS}=10V, R_G=1.5\Omega, I_D=20A$	---	6.4	---	ns
Tr	Rise Time		---	39	---	
Td(off)	Turn-Off Delay Time		---	21	---	
Tf	Fall Time		---	4.7	---	
Ciss	Input Capacitance	$V_{DS}=15V, V_{GS}=0V, f=1\text{MHz}$	---	896	---	pF
Coss	Output Capacitance		---	126	---	
Crss	Reverse Transfer Capacitance		---	108	---	
IS	Continuous Source Current ^{1,5}	$V_G=V_D=0V, \text{Force Current}$	---	---	37	A
ISM	Pulsed Source Current ^{2,5}		---	---	75	A
VSD	Diode Forward Voltage ²	$V_{GS}=0V, I_S=1A, T_J=25^\circ\text{C}$	---	---	1	V

Note :

- 1、 The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper.
- 2、 The data tested by pulsed , pulse width $\leq 300\mu\text{s}$, duty cycle $\leq 2\%$
- 3、 The EAS data shows Max. rating . The test condition is $V_{DD}=25V, V_{GS}=10V, L=0.1\text{mH}, I_{AS}=13A$
- 4、 The power dissipation is limited by 150°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

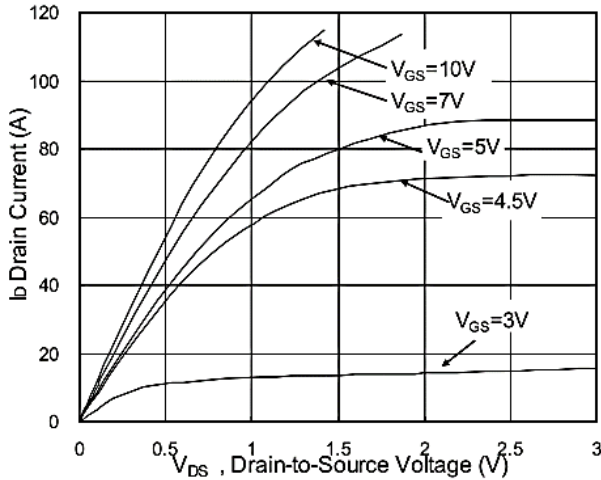


Figure1: Typical Output Characteristics

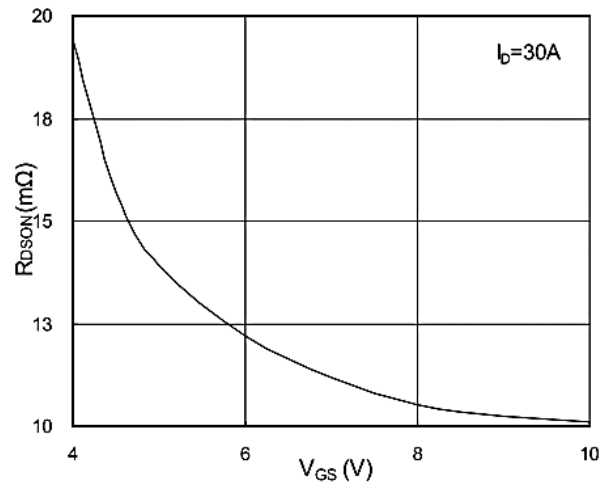


Figure2: On-Resistance vs. G-S Voltage

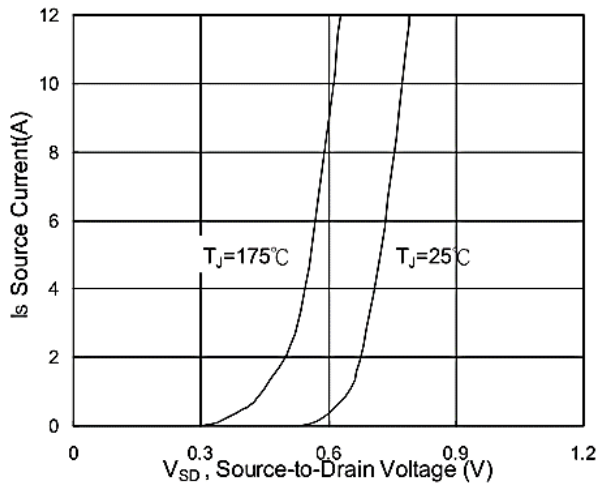


Figure3: Forward Characteristics of Reverse diode

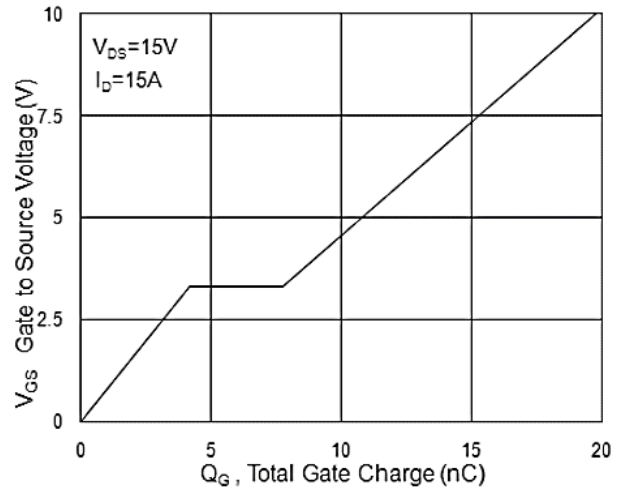


Figure 4: Gate-Charge Characteristics

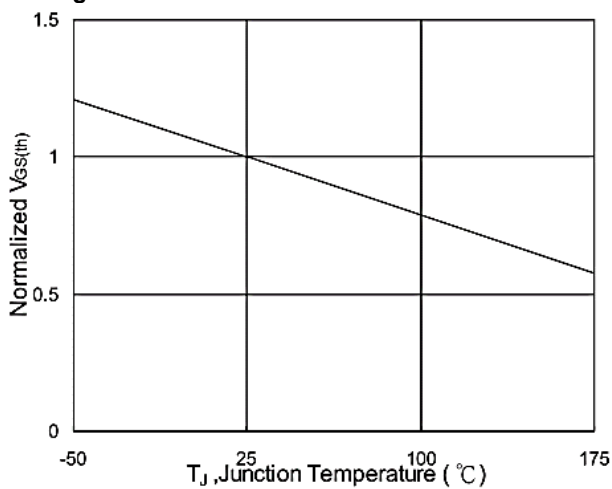


Figure5: Normalized $V_{GS(th)}$ vs. T_J

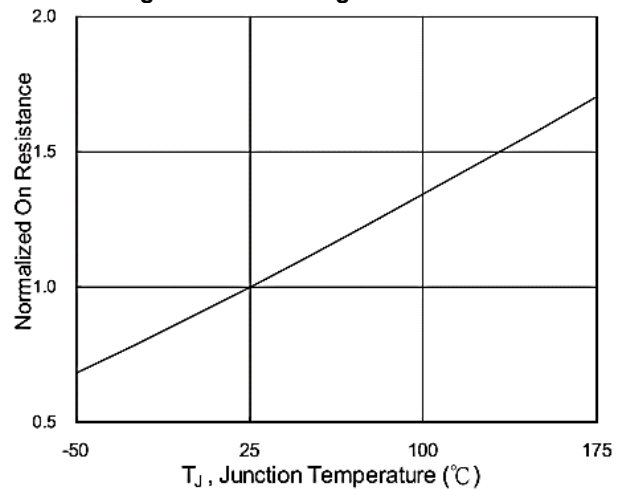


Figure6: Normalized $R_{DS(on)}$ vs. T_J

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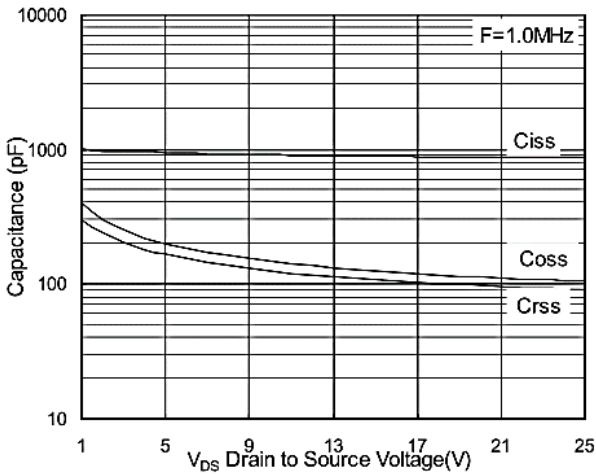


Figure7:Capacitance

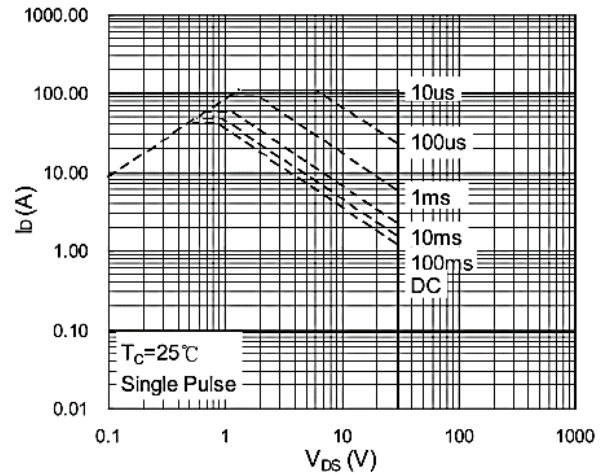


Figure8:Safe Operating Area

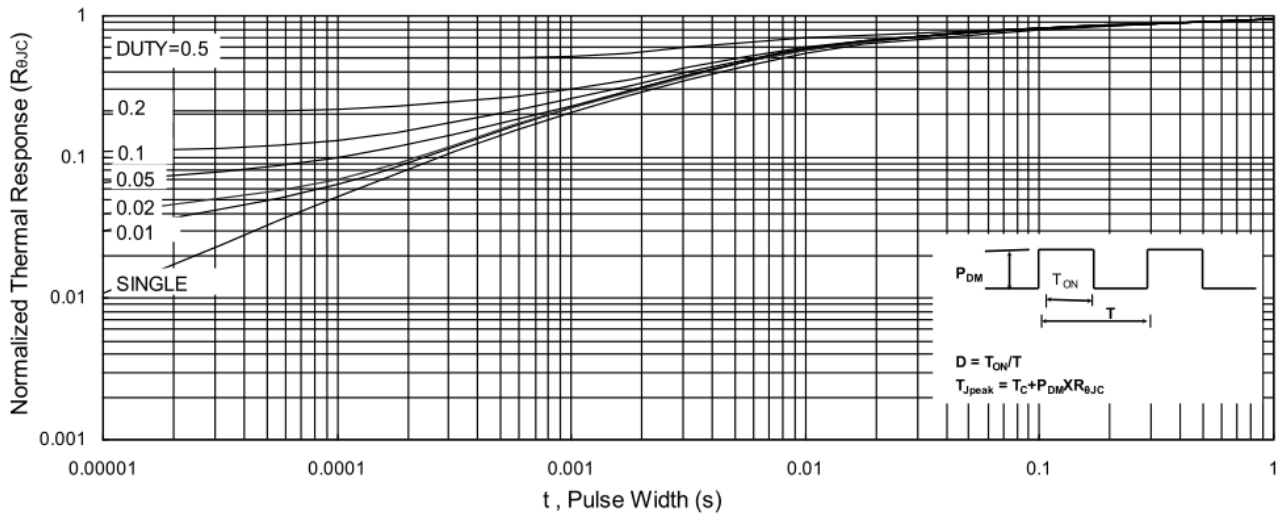


Figure9: Normalized Maximum Transient Thermal Impedance

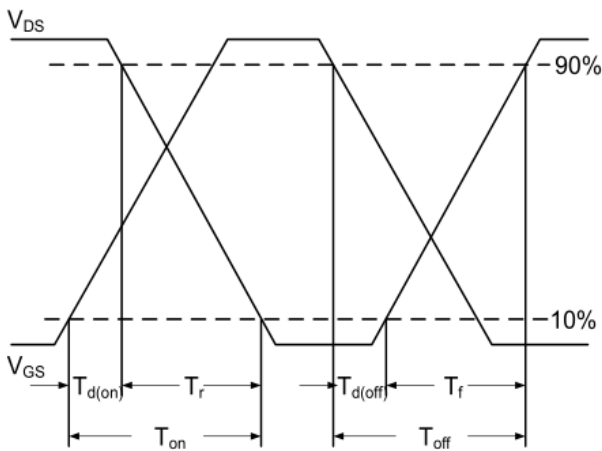


Figure10: Switching Time Waveform

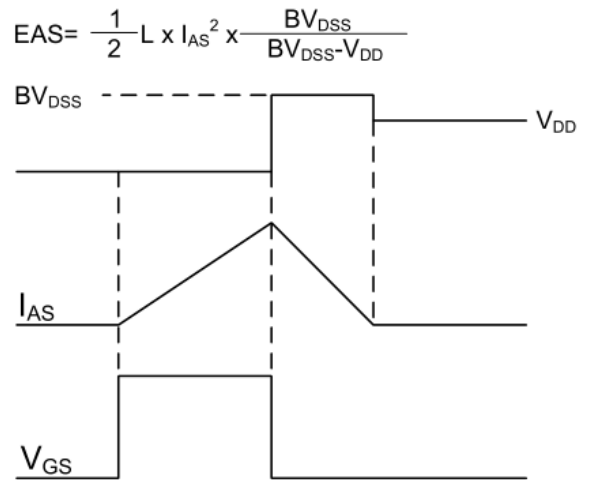
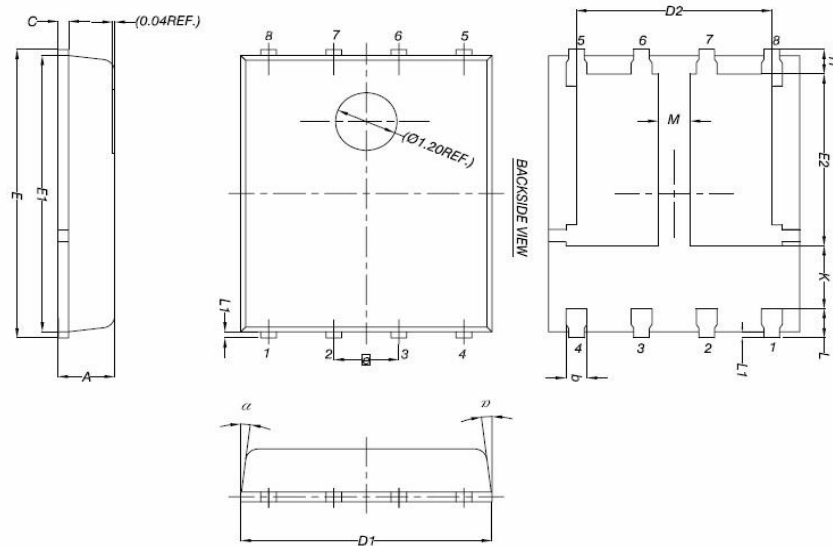


Fig.11 Unclamped Inductive Switching Waveform

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



Symbol	Common		
	mm		
	Mim	Nom	Max
A	0.90	1.00	1.10
b	0.33	0.41	0.51
C	0.20	0.25	0.30
D1	4.80	4.90	5.00
D2	3.61	3.81	3.96
E	5.90	6.00	6.10
E1	5.70	3.30	3.45
E2	3.38	3.05	3.20
e	1.27BSC		
H	0.41	0.51	0.61
K	1.10	--	--
L	0.51	0.61	0.71
L1	0.06	0.13	0.20
M	0.50	--	--
a	0°	--	12°

30V N+N-Channel Enhancement Mode MOSFET**Attention**

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