

## 20V N-Channel Enhancement Mode MOSFET

### Description

The AP70N02NF 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

$V_{DS}=20V$   $I_D=70A$

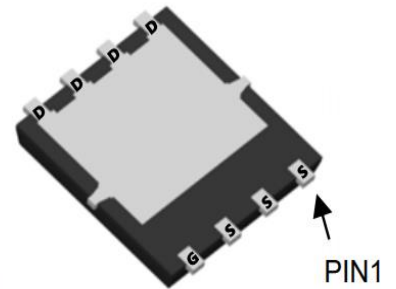
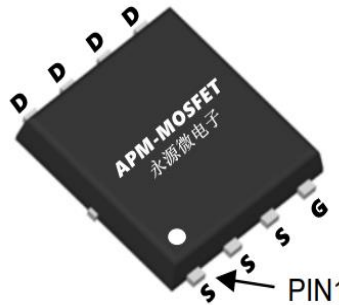
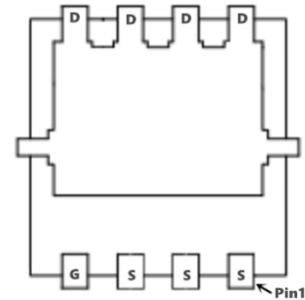
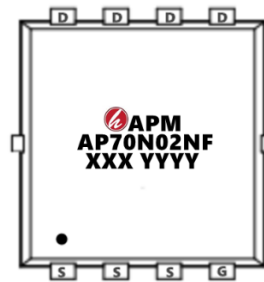
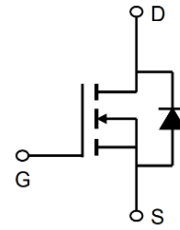
$R_{DS(ON)} < 5.5m\Omega @ V_{GS}=4.5V$  (Type: **3.8m $\Omega$** )

### Application

Battery protection

Load switch

Uninterruptible power supply



### Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
AP70N02NF	PDFN5*6-8L	AP70N02NF XXX YYYY	5000

### Absolute Maximum Ratings (TC=25°C unless otherwise noted)

Symbol	Parameter	Max.	Units
VDSS	Drain-Source Voltage	20	V
VGSS	Gate-Source Voltage	±12	V
ID@TA=25°C	Continuous Drain Current, VGS @ 4.5V	60	A
ID@TA=70°C	Continuous Drain Current, VGS @ 4.5V	42	A
IDM	Pulsed Drain Current note1	210	A
EAS	Single Pulsed Avalanche Energy note2	56.2	mJ
PD@TA=25°C	Power Dissipation	57	W
TJ, TSTG	Operating and Storage Temperature Range	-55 to +175	°C
RθJA	Thermal Resistance Junction-Ambient <sup>1</sup>	62	°C/W
RθJC	Thermal Resistance, Junction to Case	2.63	°C/W



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### Electrical Characteristics (T<sub>C</sub>=25°C, unless otherwise noted)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
V(BR)DSS	Drain-Source Breakdown Voltage	VGS=0V, ID=250μA	20	24	-	V
IDSS	Zero Gate Voltage Drain Current	VDS=20V, VGS=0V,	-	-	1.0	μA
IGSS	Gate to Body Leakage Current	VDS=0V, VGS=±12V	-	-	±100	nA
VGS(th)	Gate Threshold Voltage	VDS=VGS, ID=250μA	0.5	0.7	1.2	V
RDS(on)	Static Drain-Source on-Resistance note3	VGS=4.5V, ID=30A	-	3.8	5.5	mΩ
		VGS=2.5V, ID=20A	-	7.4	9.0	
Ciss	Input Capacitance	VDS=10V, VGS=0V, f = 1.0MHz	-	2500	-	pF
Coss	Output Capacitance		-	407	-	pF
Crss	Reverse Transfer Capacitance		-	386	-	pF
Qg	Total Gate Charge	VDS=10V, ID=30A, VGS=4.5V	-	32	-	nC
Qgs	Gate-Source Charge		-	3	-	nC
Qgd	Gate-Drain("Miller") Charge		-	11	-	nC
td(on)	Turn-on Delay Time	VDS=10V, ID=30A, RGEN=3Ω, VGS =4.5V	-	17	-	ns
tr	Turn-on Rise Time		-	49	-	ns
td(off)	Turn-off Delay Time		-	74	-	ns
tf	Turn-off Fall Time		-	26	-	ns
IS	Maximum Continuous Drain to Source Diode Forward Current		-	-	75	A
ISM	Maximum Pulsed Drain to Source Diode Forward Current		-	-	300	A
VSD	Drain to Source Diode Forward Voltage	VGS = 0V, IS=30A	-	-	1.2	V

#### Notes:

- 1、 Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
- 2、 The test condition is, VDD=10V, VG=4.5V, L=0.5mH, RG=25Ω, IAS=15A
- 3、 The data tested by pulsed Pulse Test: Pulse Width≤300μs, Duty Cycle≤0.5%
- 4、 The power dissipation is limited by 150°C junction temperature

### Typical Characteristics

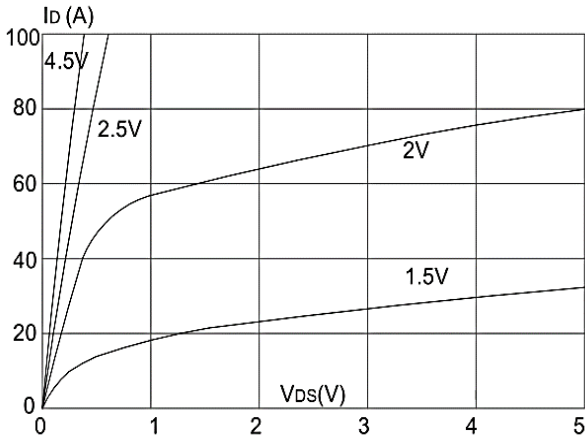


Figure 1: Output Characteristics

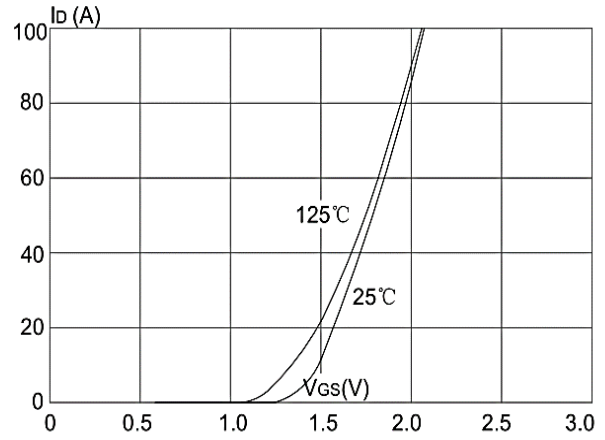


Figure 2: Typical Transfer Characteristics

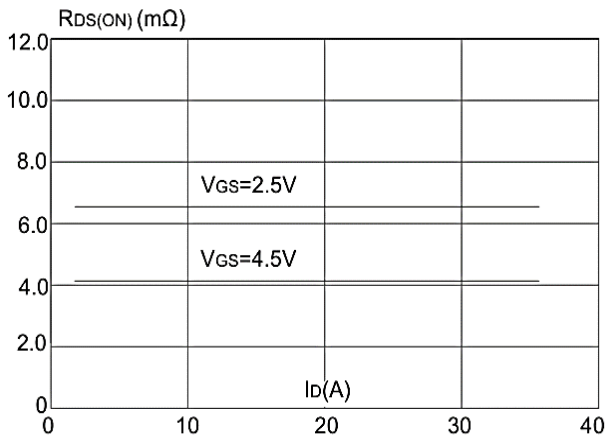


Figure 3: On-resistance vs. Drain Current

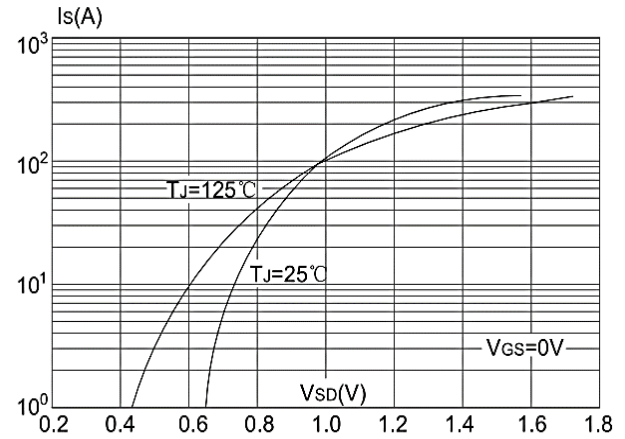


Figure 4: Body Diode Characteristics

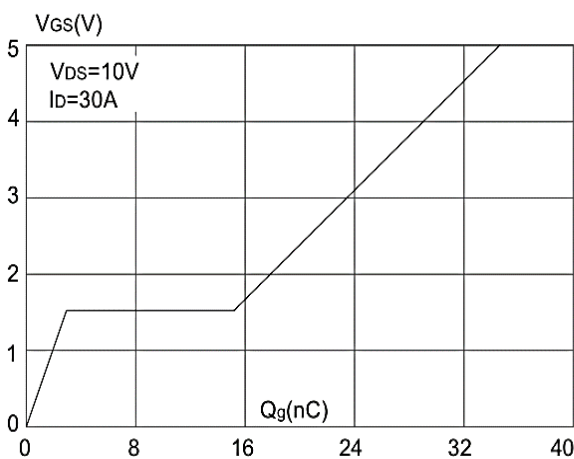


Figure 5: Gate Charge Characteristics

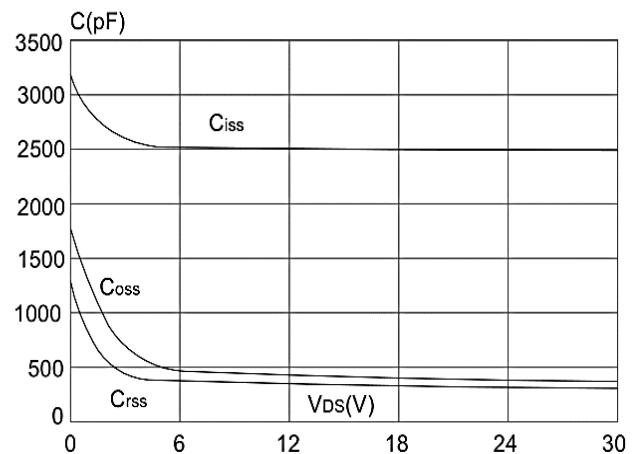
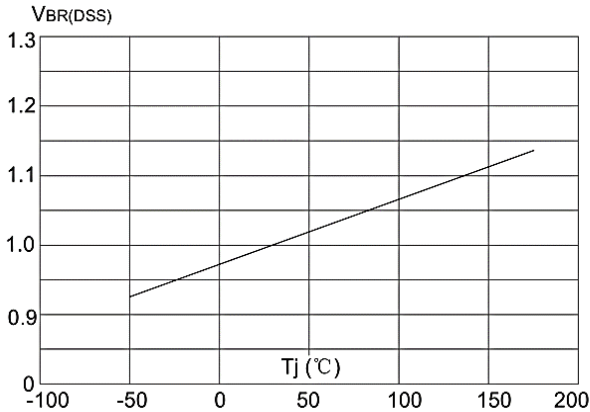
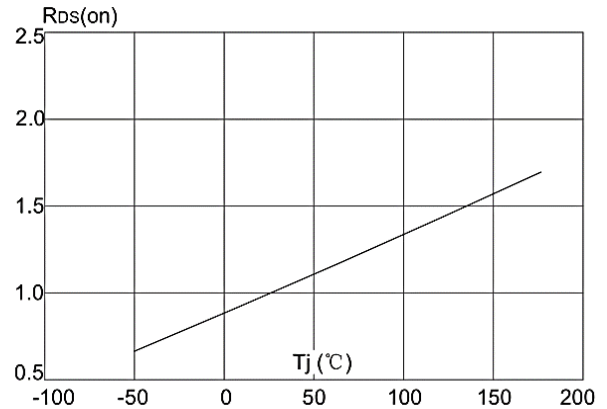


Figure 6: Capacitance Characteristics

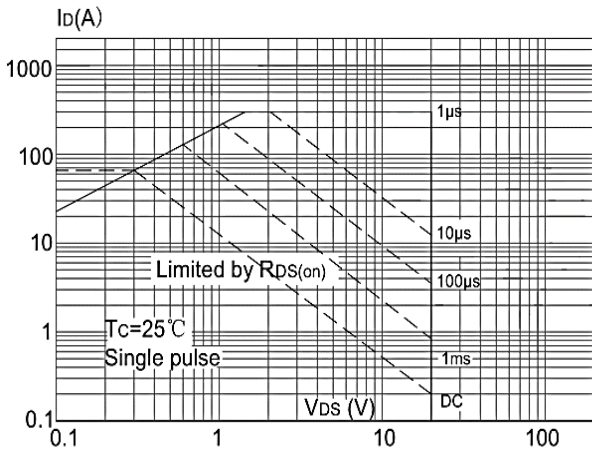
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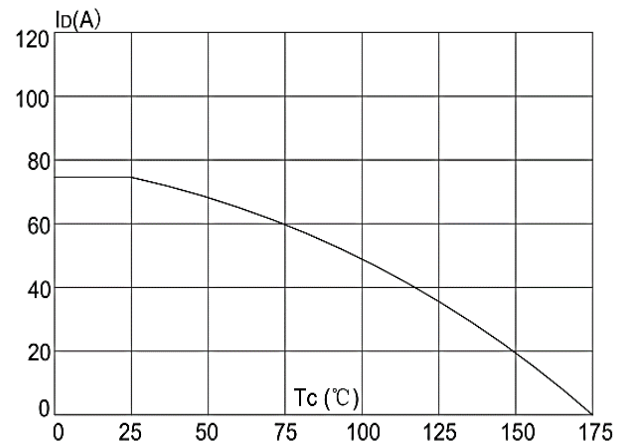
**Figure 7: Normalized Breakdown Voltage vs. Junction Temperature**



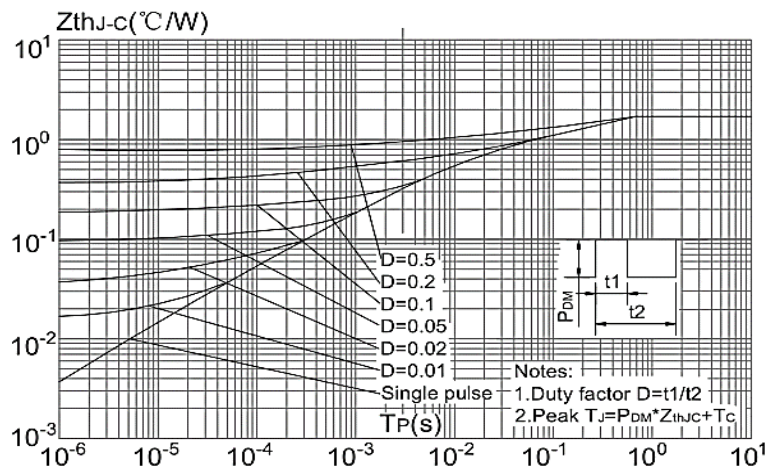
**Figure 8: Normalized on Resistance vs. Junction Temperature**



**Figure 9: Maximum Safe Operating Area Current Temperature**

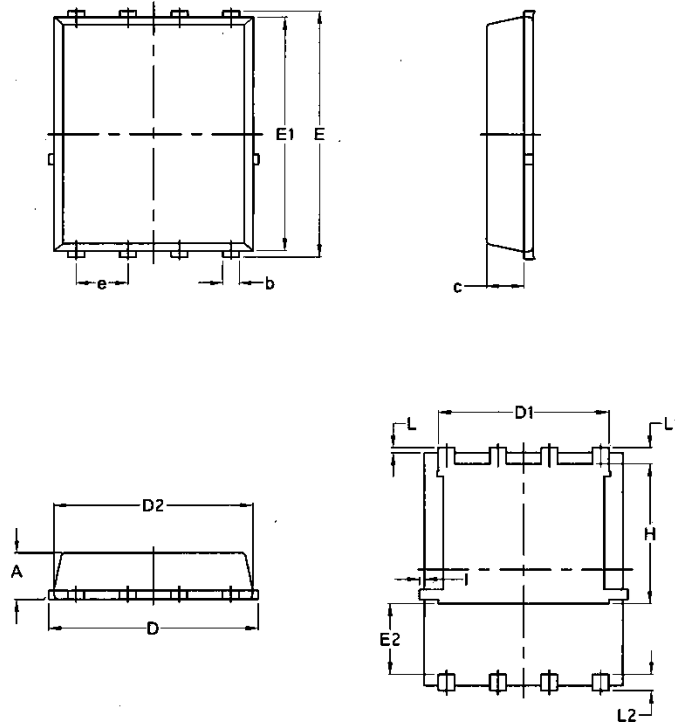


**Figure 10: Maximum Continuous Drain vs. Case**



**Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Case**

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



Symbol	Common			
	mm		Inch	
	Min	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	2022/4/31	Initial release

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