

20V N-Channel Enhancement Mode MOSFET

Description

The AP80N02DF 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

$V_{DS} = 20V$ $I_D = 80A$

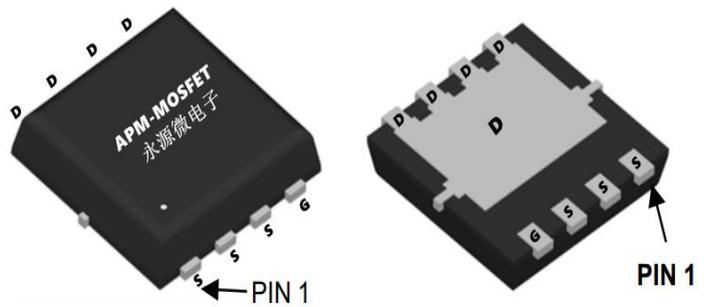
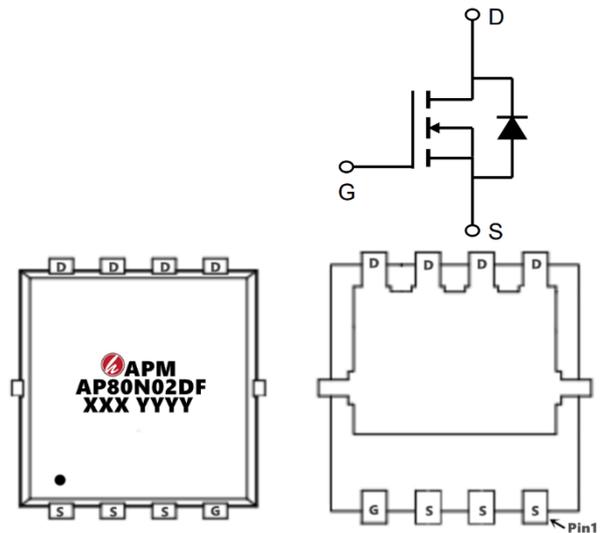
$R_{DS(ON)} < 3.5m\Omega @ V_{GS}=4.5V$ (Type: 3.0m Ω)

Application

Battery protection

Load switch

Uninterruptible power supply



Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
AP80N02DF	PDFN3*3-8L	AP80N02DF XXX YYYY	5000

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

Symbol	Parameter	Max.	Units
V_{DSS}	Drain-Source Voltage	20	V
V_{GSS}	Gate-Source Voltage	± 12	V
$I_D @ T_C=25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	80	A
$I_D @ T_C=100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	59	A
IDM	Pulsed Drain Current ^{note1}	360	A
EAS	Single Pulsed Avalanche Energy ^{note2}	110	mJ
P_D	Power Dissipation	81	W
TJ, TSTG	Operating and Storage Temperature Range	-55 to +175	$^\circ C$
$R_{\theta JA}$	Thermal Resistance Junction-Ambient ¹	62	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance, Junction to Case	1.85	$^\circ C/W$



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Electrical Characteristics (T_C=25°C 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 note3	V _{GS} =4.5V, I _D =30A	-	3.0	3.5	mΩ
		V _{GS} =2.5V, I _D =20A	-	4.0	5.5	
C _{iss}	Input Capacitance	V _{DS} =10V, V _{GS} =0V, f=1.0MHz	-	3200	-	pF
C _{oss}	Output Capacitance		-	460	-	pF
C _{rss}	Reverse Transfer Capacitance		-	445	-	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		-	-	90	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°C	-	-	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 inch² 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°C, V_{DD}=15V, V_G=4.5V, R_G=25Ω, L=0.5mH, I_{AS}=21A
- 4、 The power dissipation is limited by 175°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

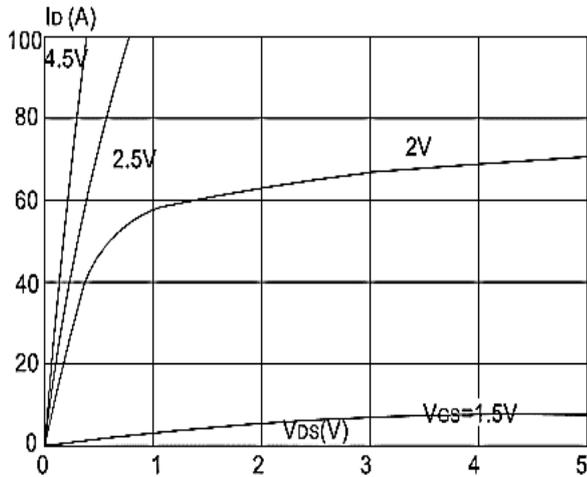


Figure 1: Output Characteristics

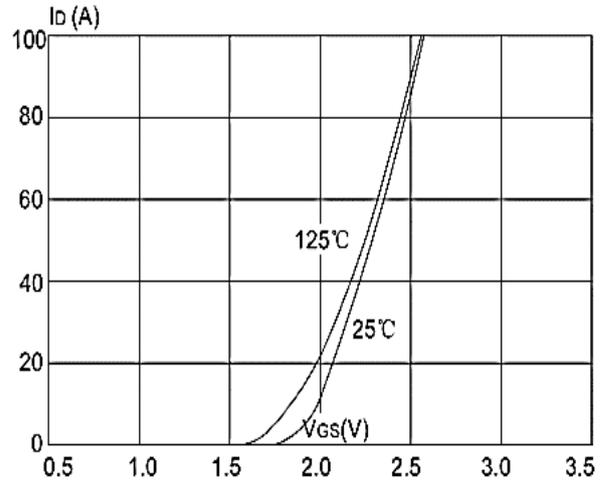


Figure 2: Typical Transfer Characteristics

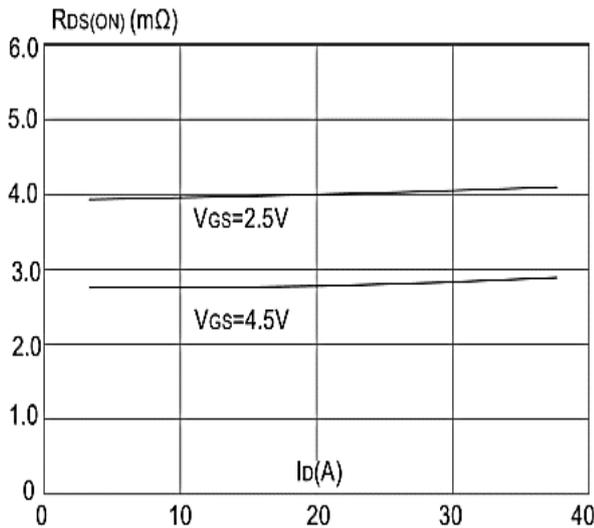


Figure 3: On-resistance vs. Drain Current

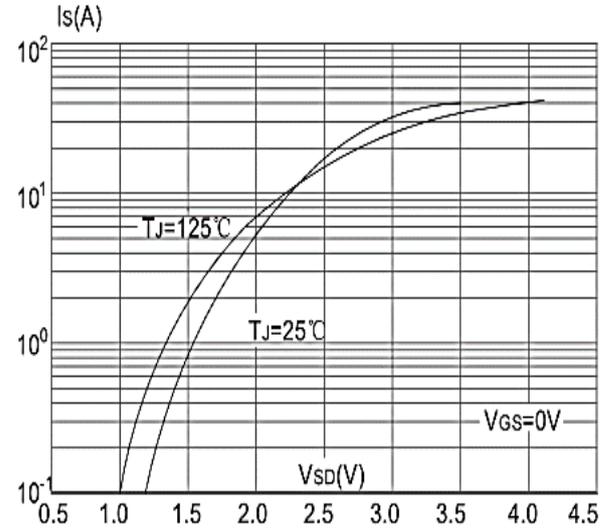
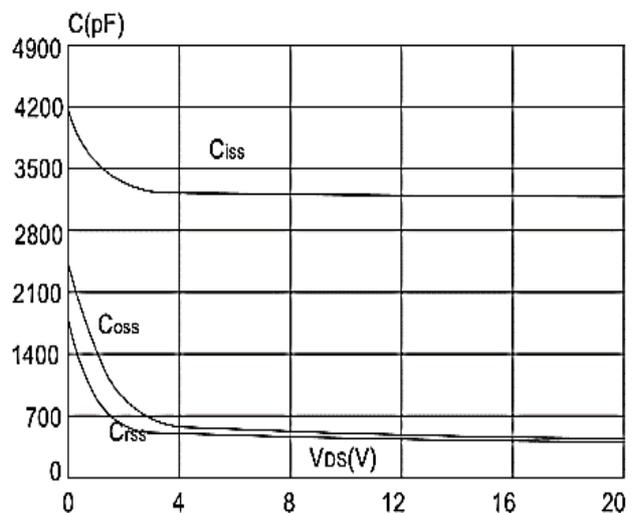
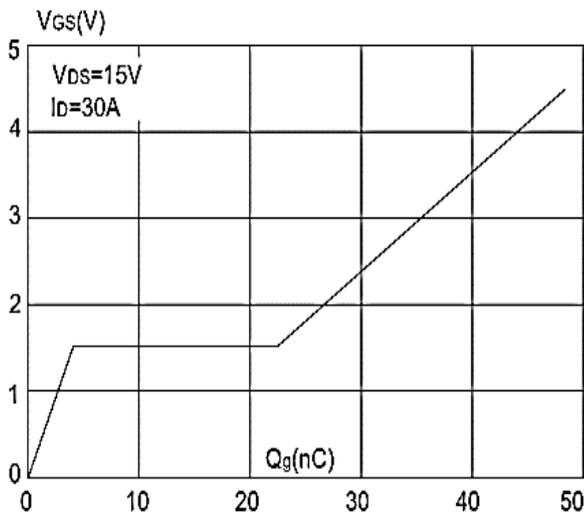


Figure 4: Body Diode Characteristics



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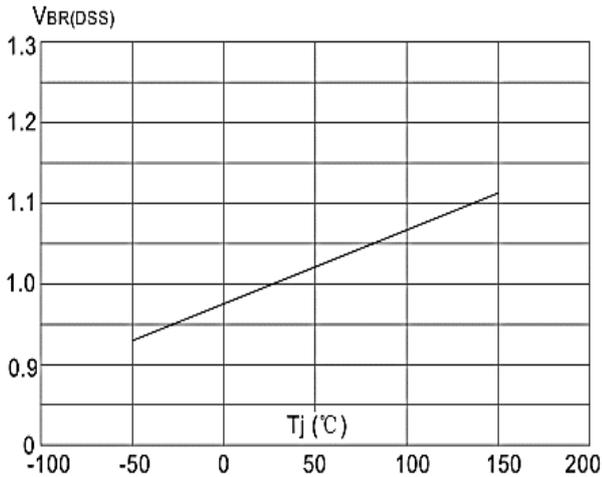


Figure 7: Normalized Breakdown Voltage vs Junction Temperature

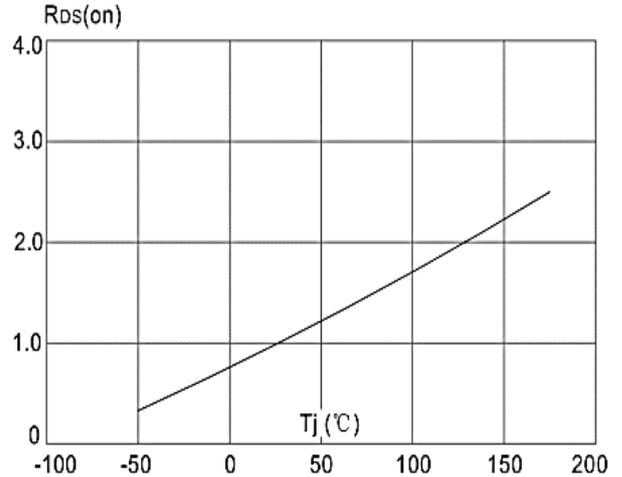


Figure 8: Normalized on Resistance vs. Junction Temperature

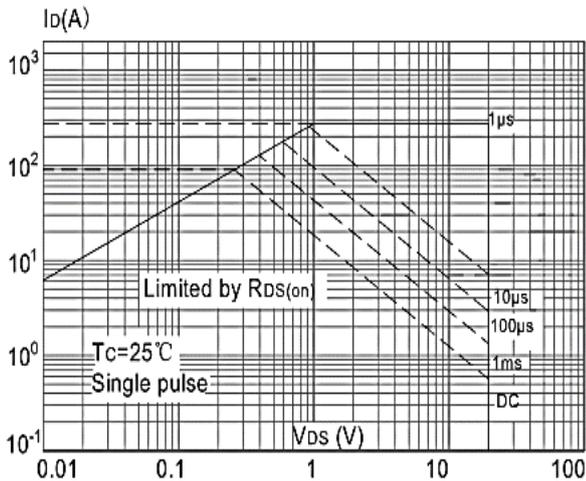


Figure 9: Maximum Safe Operating Area

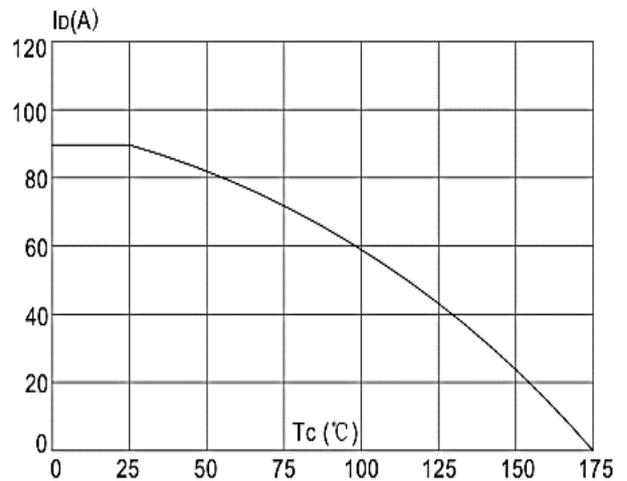


Figure 10: Maximum Continuous Drain Current vs. Ambient Temperature

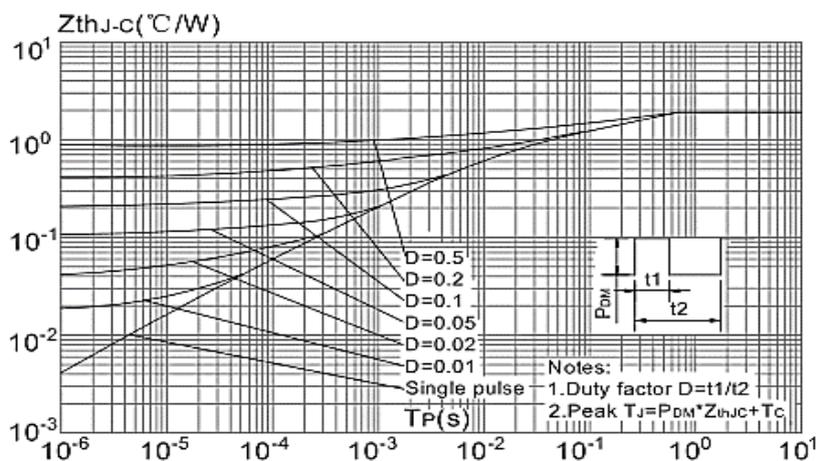
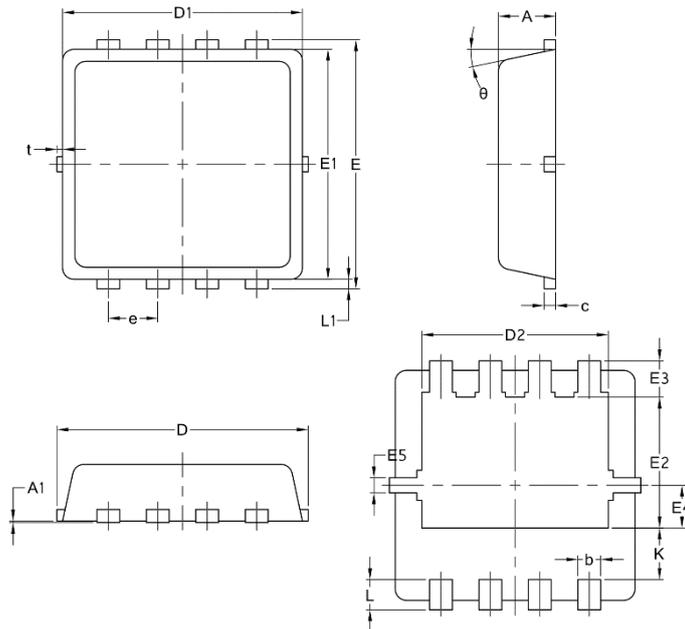


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Ambien

Package Mechanical Data-PDFN3*3-8L-JQ Single



Symbol	Common		
	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
REV1.0	2022/4/31	Initial release

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