

-20V P-Channel Enhancement Mode MOSFET

Description

The AP30P02DF 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

$V_{DS} = -20V$ $I_D = -30A$

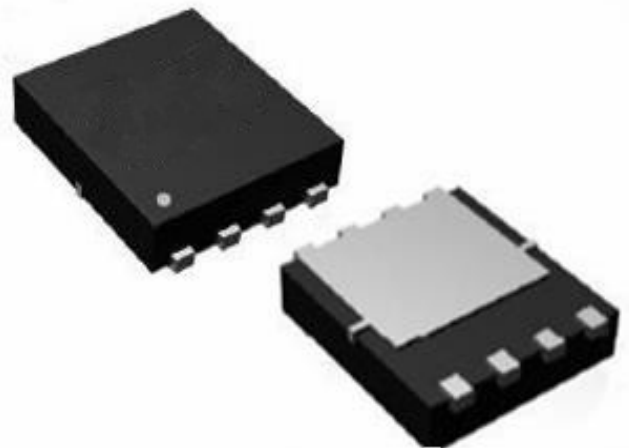
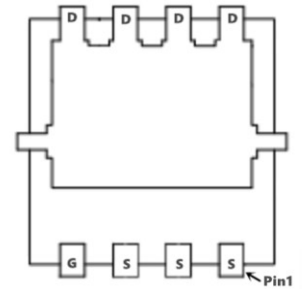
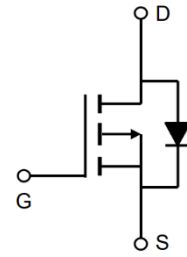
$R_{DS(ON)} < 20m\Omega$ @ $V_{GS} = -4.5V$ (Type: 16m Ω)

Application

Battery protection

Load switch

Uninterruptible power supply



Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
AP30P02DF	PDFN3*3-8L	AP30P02DF XXX YYYY	5000

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

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	-20	V
V_{GS}	Gate-Source Voltage	± 12	V
$I_D @ T_C = 25^\circ C$	Continuous Drain Current, $V_{GS} @ -4.5V^1$	-30	A
$I_D @ T_C = 70^\circ C$	Continuous Drain Current, $V_{GS} @ -4.5V^1$	-15	A
IDM	Pulsed Drain Current ²	-48	A
$P_D @ T_C = 25^\circ C$	Total Power Dissipation ³	24	W
$P_D @ T_C = 70^\circ C$	Total Power Dissipation ³	21.5	W
TSTG	Storage Temperature Range	-55 to 150	$^\circ C$
T_J	Operating Junction Temperature Range	-55 to 150	$^\circ C$
$R_{\theta JA}$	Thermal Resistance Junction-Ambient ¹	75	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance Junction-Case ¹	4.2	$^\circ C/W$



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Electrical Characteristics (T_J=25°C, unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BVDSS	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =-250uA	-20	-24	---	V
ΔBVDSS/ΔT _J	BV _{DSS} Temperature Coefficient	Reference to 25°C, I _D =-1mA	---	-0.012	---	V/°C
RDS(ON)	Static Drain-Source On-Resistance ²	V _{GS} =-4.5V, I _D =-20A	---	16	20	mΩ
RDS(ON)	Static Drain-Source On-Resistance ²	V _{GS} =-2.5V, I _D =-10A	---	22	28	
VGS(th)	Gate Threshold Voltage	V _{GS} =V _{DS} , I _D =-250uA	-0.5	0.6	-1.2	V
ΔVGS(th)	V _{GS(th)} Temperature Coefficient		---	2.94	---	mV/°C
IDSS	Drain-Source Leakage Current	V _{DS} =-20V, V _{GS} =0V, T _J =25°C	---	---	1	uA
IGSS	Gate-Source Leakage Current	V _{GS} =±12V, V _{DS} =0V	---	---	±100	nA
Q _g	Total Gate Charge (-4.5V)	V _{DS} =-10V, V _{GS} =-4.5V, I _D =-6A	---	15.3	---	nC
Q _{gs}	Gate-Source Charge		---	2.2	---	
Q _{gd}	Gate-Drain Charge		---	4.4	---	
Td(on)	Turn-On Delay Time	V _{DD} =-10V, V _{GS} =-4.5V, R _G =3.3Ω, I _D =-10A	---	10	---	ns
T _r	Rise Time		---	31	---	
Td(off)	Turn-Off Delay Time		---	28	---	
T _f	Fall Time		---	8	---	
Ciss	Input Capacitance	V _{DS} =-10V, V _{GS} =0V, f=1MHz	---	2000	---	pF
Coss	Output Capacitance		---	242	---	
Crss	Reverse Transfer Capacitance		---	231	---	
IS	Continuous Source Current ^{1,4}	V _G =V _D =0V, Force Current	---	---	-20	A
ISM	Pulsed Source Current ^{2,4}		---	---	-48	A
VSD	Diode Forward Voltage ²	V _{GS} =0V, I _S =-1A, T _J =25°C	---	---	-1.2	V

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 ≅ 300us , duty cycle ≅ 2%
- 3、 The power dissipation is limited by 150°C junction temperature
- 4、 The data is theoretically the same as I D and I DM , in real applications , should be limited by total power dissipation.

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Typical Characteristics

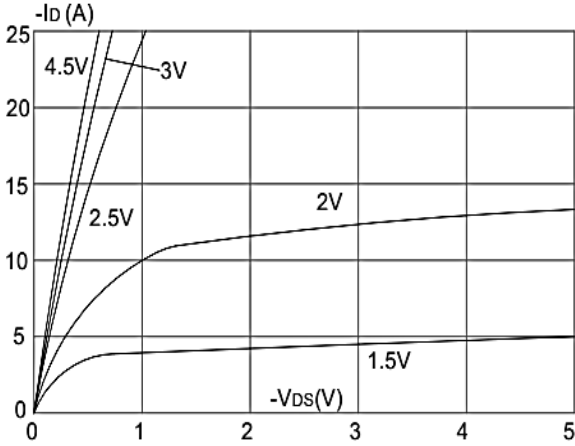


Figure 1: Output Characteristics

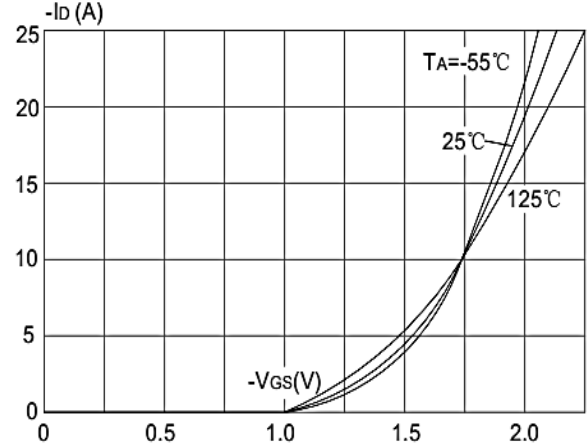


Figure 2: Typical Transfer Characteristics

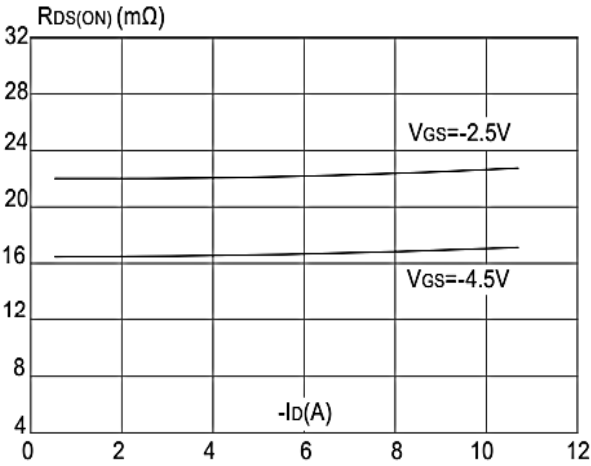


Figure 3: On-resistance vs. Drain Current

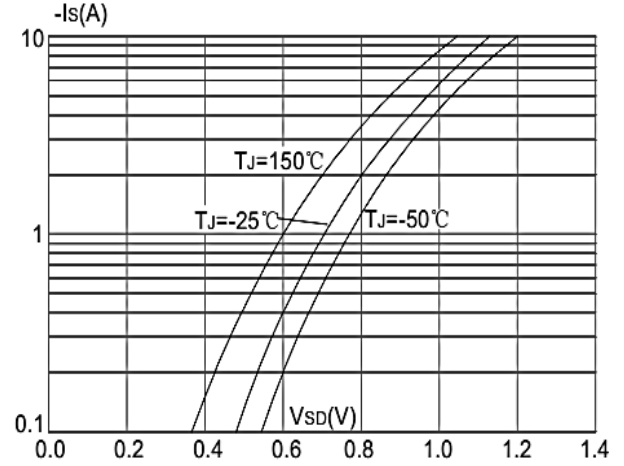


Figure 4: Body Diode Characteristics

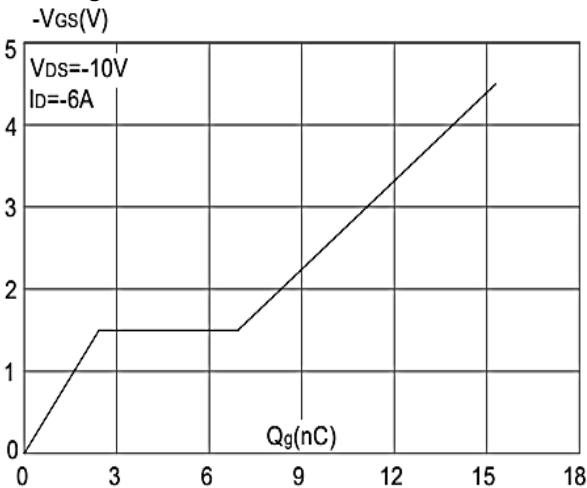


Figure 5: Gate Charge Characteristics

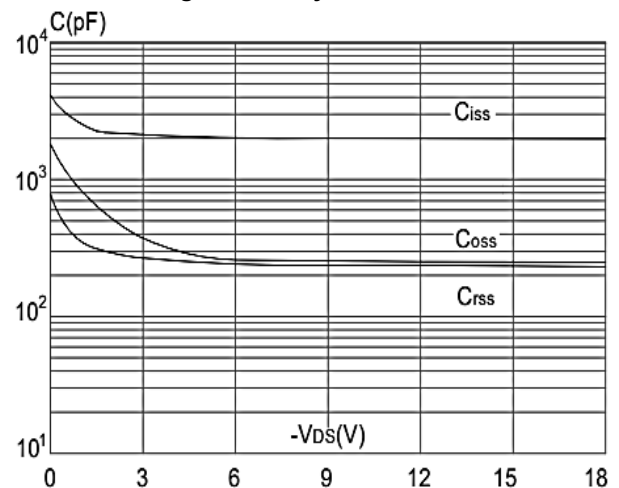


Figure 6: Capacitance Characteristics

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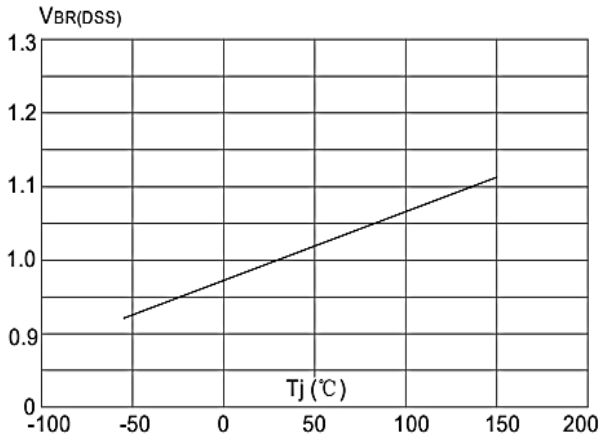


Figure 7: Normalized Breakdown Voltage vs Junction Temperature

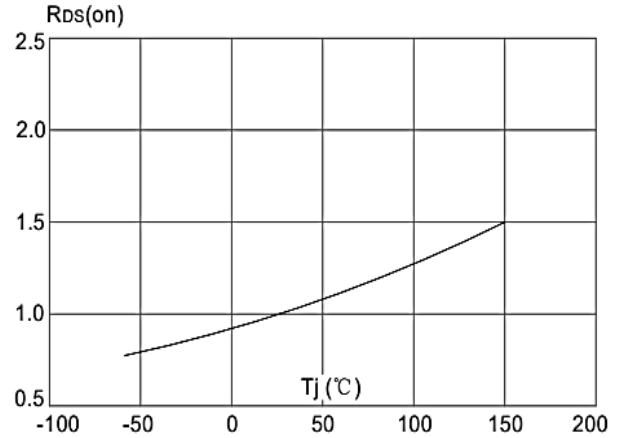


Figure 8: Normalized on Resistance vs. Junction Temperature

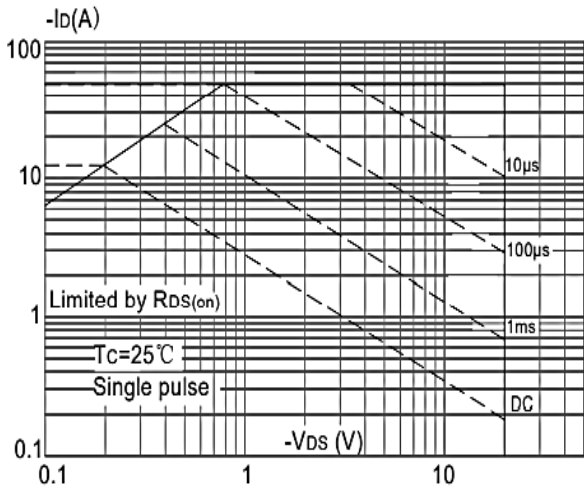


Figure 9: Maximum Safe Operating Area

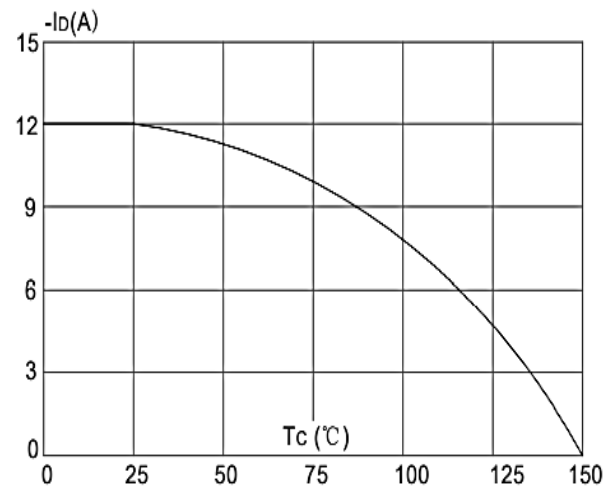


Figure 10: Maximum Continuous Drain Current vs. Ambient Temperature

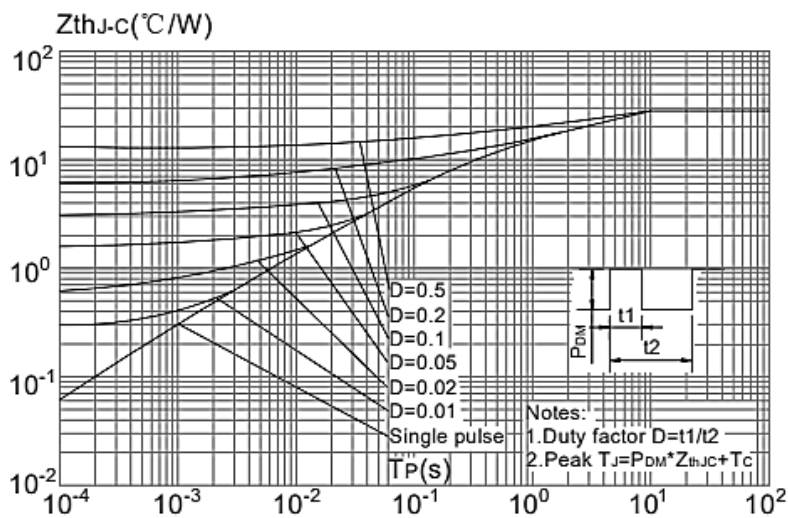
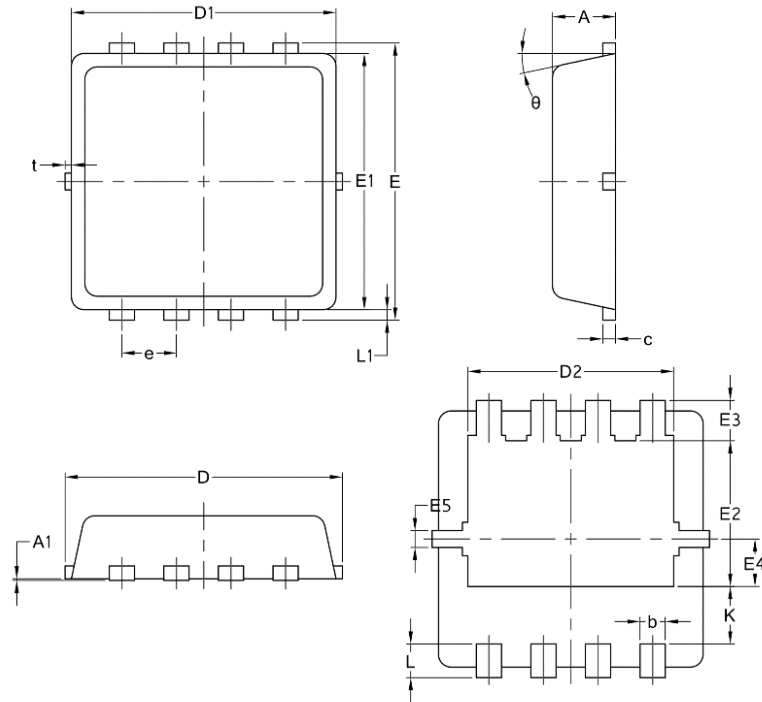


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Ambien

Package Mechanical Data-DFN3*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