

40V N-Channel Enhancement Mode MOSFET

Description

The AP75N04DF uses advanced **APM-SGT V** 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

$V_{DS} = 40V$ $I_D = 75A$

$R_{DS(ON)} < 5.5m\Omega$ @ $V_{GS} = 10V$ (**Type: 4.5mΩ**)

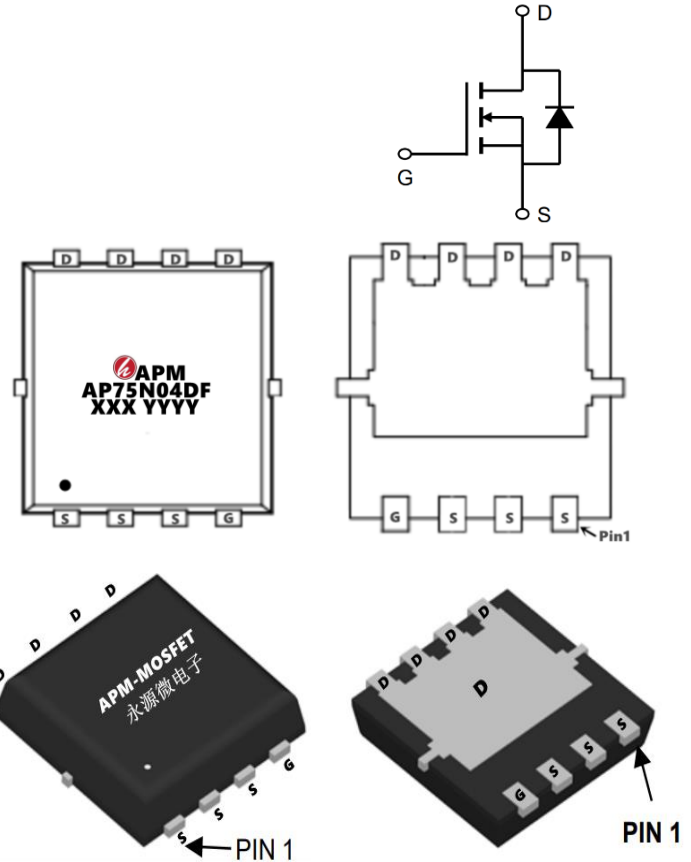
$C_{iss} \approx 1204 PF$

Application

Wireless charging

Boost driver

Brushless motor



Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
AP75N04DF	PDFN3*3-8L	AP75N04DF XXX YYYY	5000

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

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	40	V
V_{GS}	Gate-Source Voltage	± 20	V
$I_D @ T_A = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	75	A
$I_D @ T_A = 70^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	44	A
I_{DM}	Pulsed Drain Current ²	250	A
EAS	Single Pulse Avalanche Energy ³	36	mJ
I_{AS}	Avalanche Current	27	A
$P_D @ T_A = 25^\circ C$	Total Power Dissipation ⁴	42	W
T_{STG}	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	25	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance Junction-Case ¹	3.0	$^\circ C/W$

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

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BVDSS	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	40	47	---	V
RDS(ON)	Static Drain-Source On-Resistance ²	$V_{GS}=10V, I_D=30A$	---	4.5	5.5	mΩ
		$V_{GS}=4.5V, I_D=20A$	---	5.8	7.6	
VGS(th)	Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=250\mu A$	1.2	1.6	2.5	V
IDSS	Drain-Source Leakage Current	$V_{DS}=32V, V_{GS}=0V, T_J=25^\circ\text{C}$	---	---	1	uA
		$V_{DS}=32V, V_{GS}=0V, T_J=55^\circ\text{C}$	---	---	5	
IGSS	Gate-Source Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	---	---	± 100	nA
R _g	Gate Resistance	$V_{DS}=0V, V_{GS}=0V, f=1\text{MHz}$	---	1.8	---	Ω
Q _g	Total Gate Charge (4.5V)	$V_{DS}=20V, V_{GS}=4.5V, I_D=12A$	---	9.7	---	nC
Q _{gs}	Gate-Source Charge		---	3.2	---	
Q _{gd}	Gate-Drain Charge		---	4.0	---	
Td(on)	Turn-On Delay Time	$V_{DD}=15V, V_{GS}=10V, R_G=3.3\Omega, I_D=1A$	---	4.8	---	ns
T _r	Rise Time		---	8.6	---	
Td(off)	Turn-Off Delay Time		---	23	---	
T _f	Fall Time		---	15.2	---	
Ciss	Input Capacitance	$V_{DS}=20V, V_{GS}=0V, f=1\text{MHz}$	---	1204	---	pF
Coss	Output Capacitance		---	536	---	
Crss	Reverse Transfer Capacitance		---	51	---	
IS	Continuous Source Current ^{1,5}	$V_G=V_D=0V, \text{Force Current}$	---	---	42	A
VSD	Diode Forward Voltage ²	$V_{GS}=0V, I_S=1A, T_J=25^\circ\text{C}$	---	---	1.0	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 $\leq 300\mu s$, duty cycle $\leq 2\%$
- 3、The EAS data shows Max. rating . The test condition is $V_{DD}=32V, V_{GS}=10V, L=0.1mH, I_{AS}=27A$
- 4、The power dissipation is limited by 150°C junction temperature
- 5、The data is theoretically the same as I D and I DM , in real applications , should be limited by total power dissipation.

Typical Characteristics

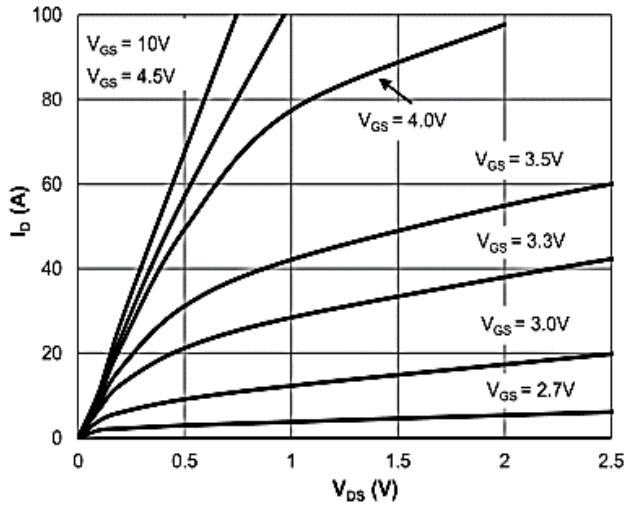


Figure 1: Saturation Characteristics

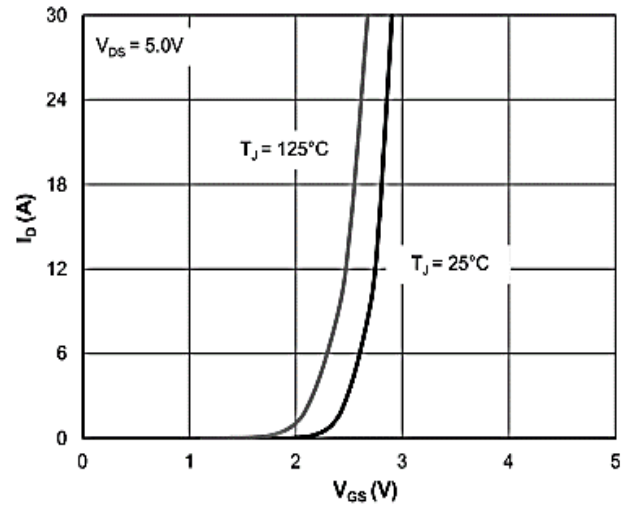


Figure 2: Transfer Characteristics

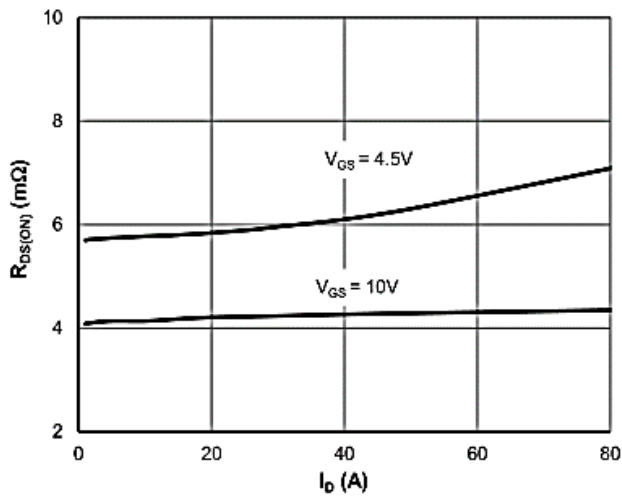


Figure 3: $R_{DS(ON)}$ vs. Drain Current

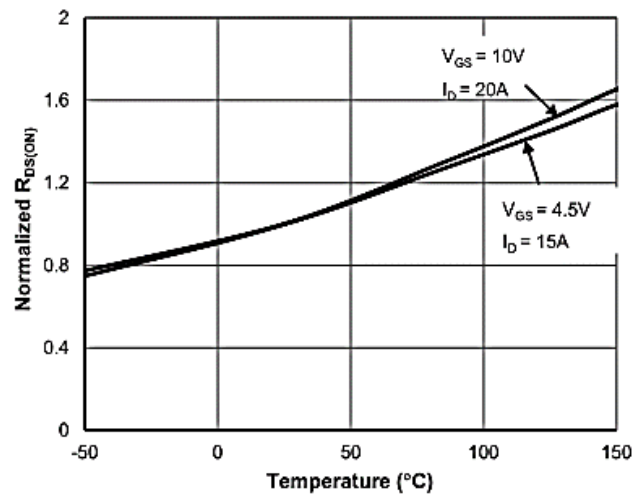


Figure 4: $R_{DS(ON)}$ vs. Junction Temperature

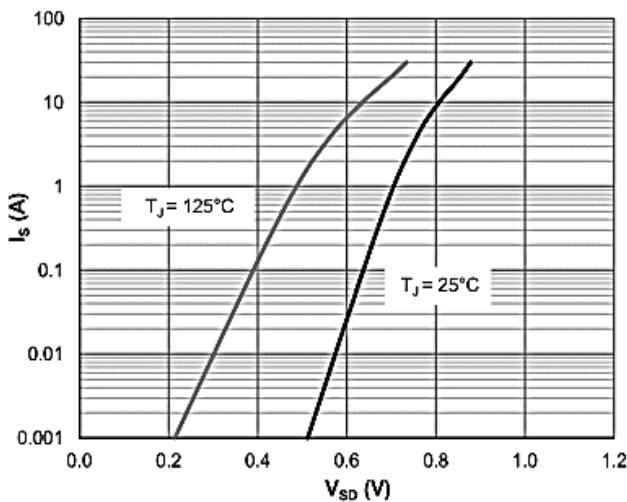


Figure 5: Body-Diode Characteristics

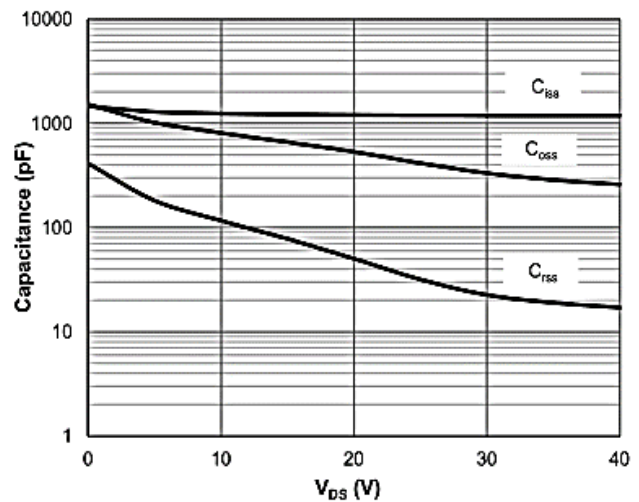
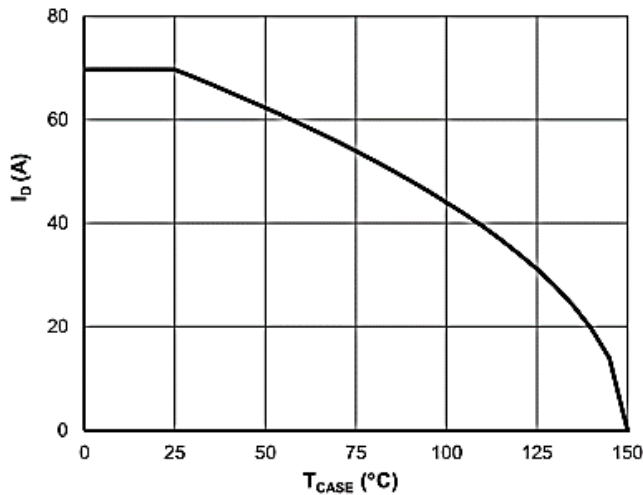
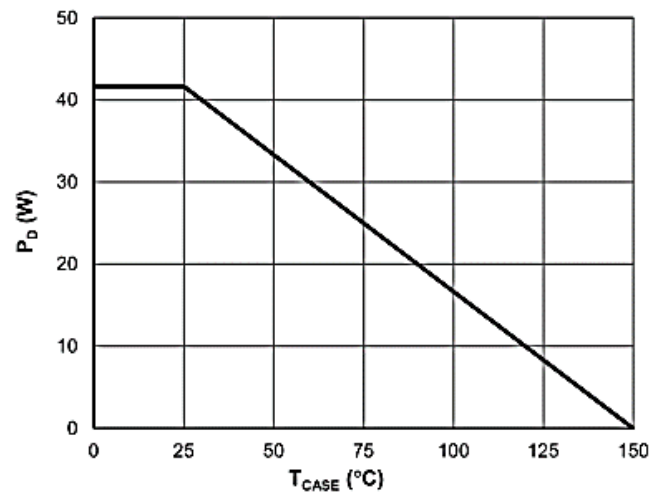
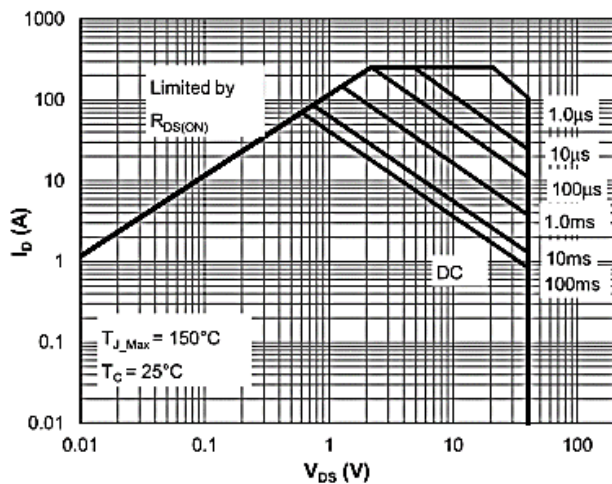
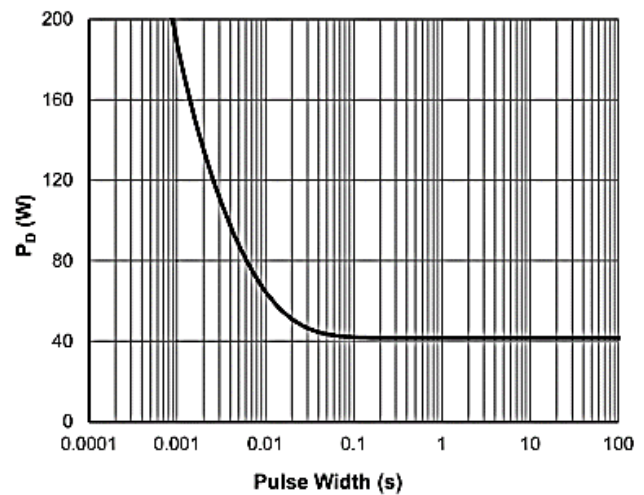
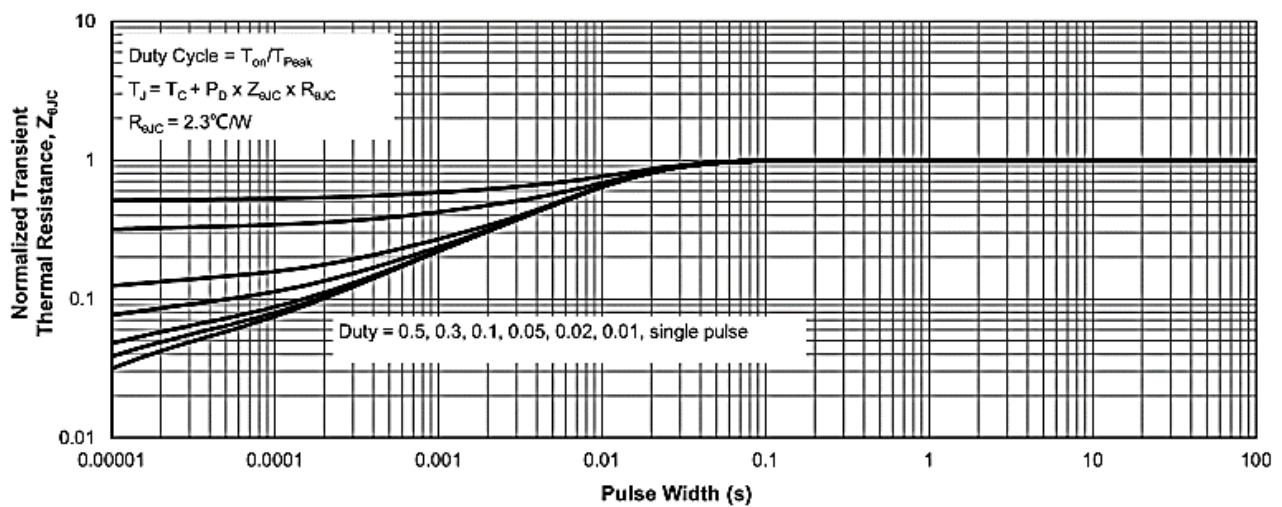
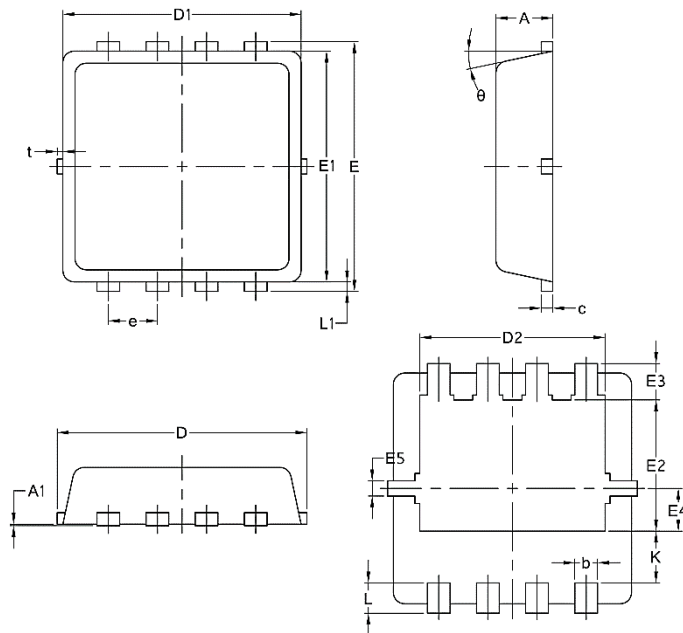


Figure 6: Capacitance Characteristics

**Figure 7: Current De-rating****Figure 8: Power De-rating****Figure 9: Maximum Safe Operating Area****Figure 10: Single Pulse Power Rating, Junction-to-Case****Figure 11: Normalized Maximum Transient Thermal Impedance**

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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AP75N04DF

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Edition	Date	Change
RVE1.0	2023/4/11	Initial release

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