

## 40V N-Channel Enhancement Mode MOSFET

### Description

The APG180N04NF 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

$V_{DS} = 40V$   $I_D = 180A$

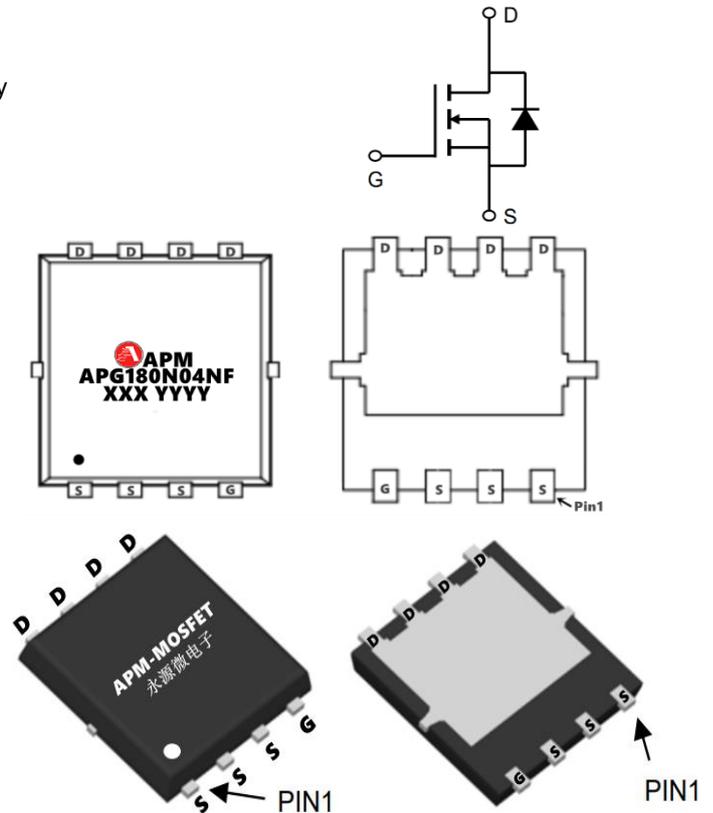
$R_{DS(ON)} < 1.3m\Omega @ V_{GS}=10V$  (Type: 1.0m $\Omega$ )

### Application

BMS

BLDC

UPS



### Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
APG180N04NF	PDFN5*6-8L	APG180N04NF XXX YYYY	5000

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

Symbol	Parameter	Max.	Units
VDSS	Drain-Source Voltage	40	V
VGSS	Gate-Source Voltage	$\pm 20$	V
$I_D@T_C=25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V_1$	180	A
$I_D@T_C=100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V_1$	125	A
IDM	Pulsed Drain Current	750	A
EAS	Single Pulsed Avalanche Energy	420	mJ
IAS	Avalanche Current	70	A
PD@TC=25°C	Power Dissipation	68	W
$R_{\theta JA}$	Thermal Resistance Junction-Ambient <sup>1</sup>	25	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance, Junction to Case	1.4	$^\circ C/W$
$T_J$	Operating Junction Temperature Range	-55 to 150	$^\circ C$
TSTG	Storage Temperature Range	-55 to 150	$^\circ C$

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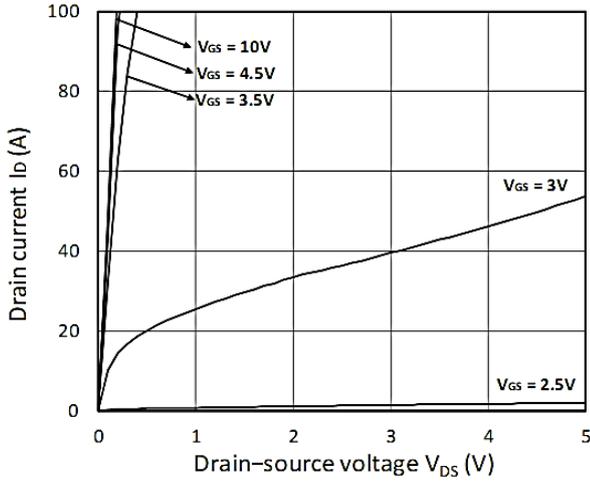
### N-Channel Electrical Characteristics ( $T_J=25^\circ\text{C}$ , unless otherwise noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V(BR)DSS	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	40	-	-	V
IGSS $T_J=25^\circ\text{C}$	Gate-Body Leakage Current	$V_{DS}=0V, V_{GS}=\pm 20V$	-	-	$\pm 100$	nA
IDSS $T_J=25^\circ\text{C}$	Zero Gate Voltage Drain Current	$V_{DS}=40V, V_{GS}=0V$			1	$\mu A$
IDSS $T_J=100^\circ\text{C}$					100	
VGS(th)	Gate-Threshold Voltage	$V_{DS} = V_{GS}, I_D=250\mu A$	1.0	1.6	2.2	V
RDS(on)	Drain-Source on-Resistance <sup>4</sup>	$V_{GS}=10V, I_D=20A$	-	1.05	1.3	m $\Omega$
		$V_{GS}=4.5V, I_D=10A$	-	1.35	1.8	
gfs	Forward Transconductance <sup>4</sup>	$V_{DS}=10V, I_D=20A$	-	125	-	S
Ciss	Input Capacitance	$V_{DS}=20V, V_{GS}=0V, f=1MHz$	-	6870	-	pF
Coss	Output Capacitance		-	1500	-	
Crss	Reverse Transfer Capacitance		-	85	-	
R <sub>G</sub>	Gate Resistance	f=1MHz	-	2.2	-	$\Omega$
Q <sub>g</sub>	Total Gate Charge	$V_{GS}=10V, V_{DS}=20V, I_D=20A$	-	116	-	nC
Q <sub>gs</sub>	Gate-Source Charge		-	16	-	
Q <sub>gd</sub>	Gate-Drain Charge		-	18	-	
td(on)	Turn-on Delay Time	$V_{GS}=10V, V_{DD}=20V, R_G=3\Omega, I_D=20A$	-	10.8	-	ns
t <sub>r</sub>	Rise Time		-	11.9	-	
td(off)	Turn-off Delay Time		-	100	-	
t <sub>f</sub>	Fall Time		-	44	-	
trr	Body Diode Reverse Recovery Time	$I_F=20A, dI/dt=100A/\mu s$	-	68	-	ns
Q <sub>rr</sub>	Body Diode Reverse Recovery Charge		-	54.4	-	nC
VSD	Diode Forward Voltage <sup>4</sup>	$I_S=20A, V_{GS}=0V$	-	-	1.2	V
IS	Continuous Source Current $T_C=25^\circ\text{C}$	-	-	-	180	A

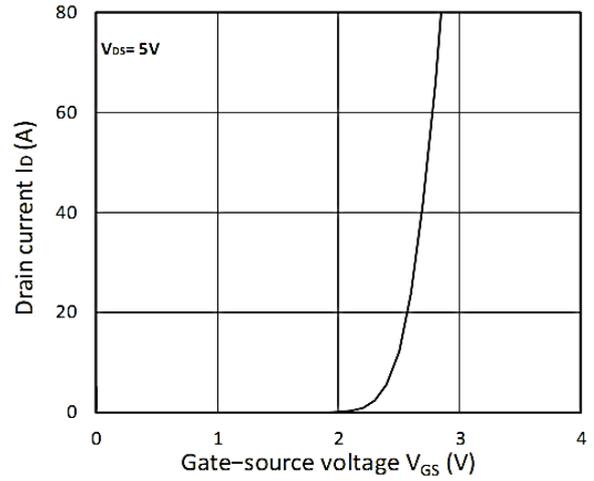
**Note :**

- 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  $V_{DD} = 32V, V_{GS} = 10V, L=0.1mH, I_{AS} = 70A$
- 4、 The power dissipation is limited by  $150^\circ\text{C}$  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.

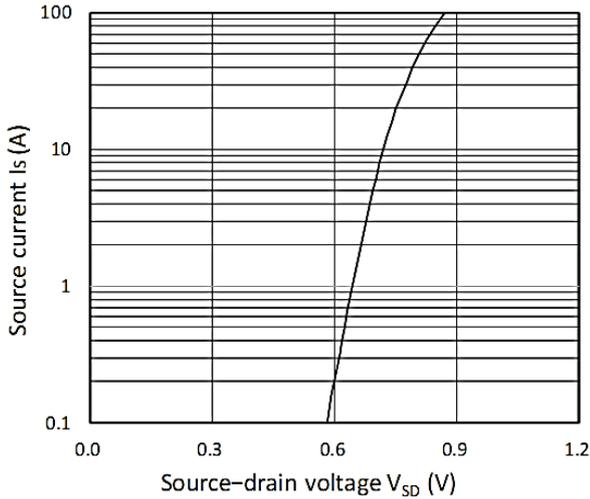
**Typical Characteristics**



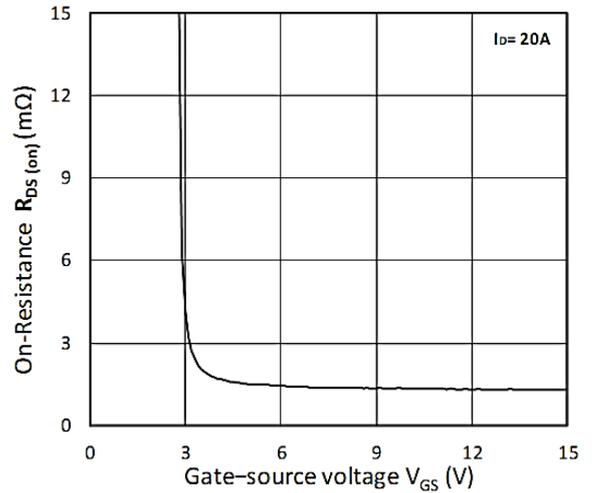
**Figure 1. Output Characteristics**



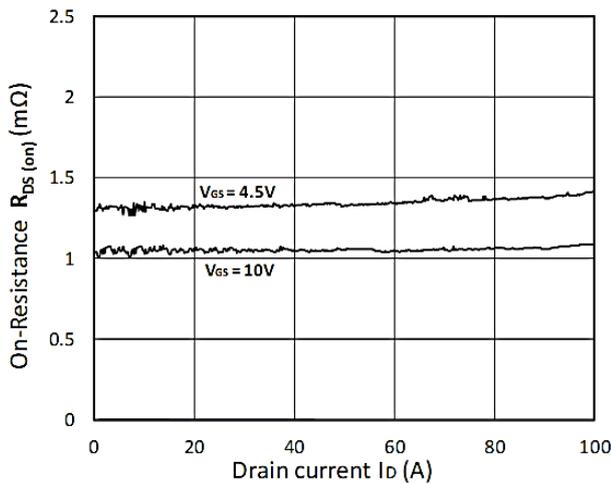
**Figure 2. Transfer Characteristics**



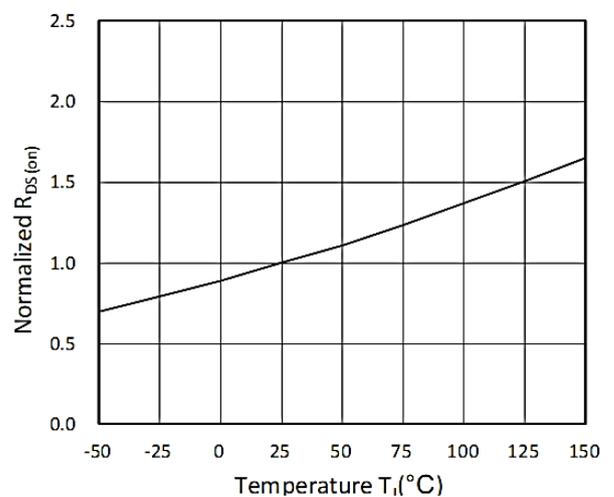
**Figure 3. Forward Characteristics of Reverse**



**Figure 4. RDS(ON) vs. VGS**



**Figure 5. RDS(ON) vs. ID**



**Figure 6. Normalized RDS(on) vs. Temperature**

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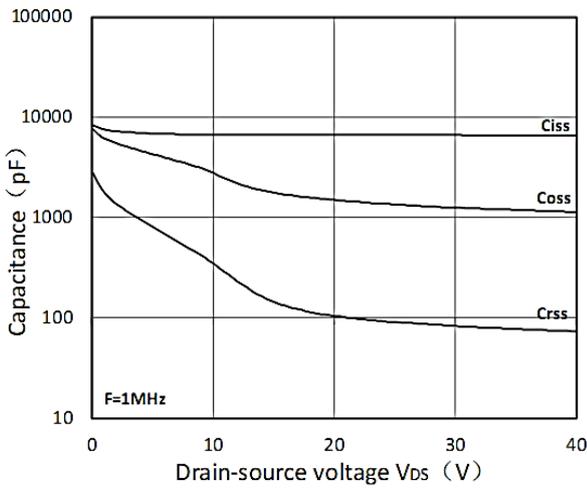


Figure 7. Capacitance Characteristics

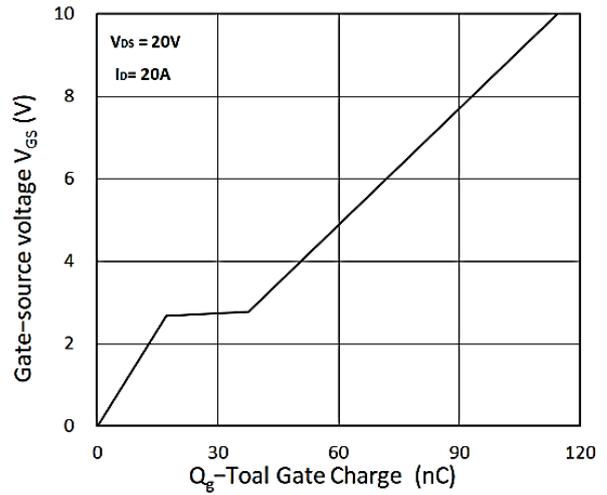


Figure 8. Gate Charge Characteristics

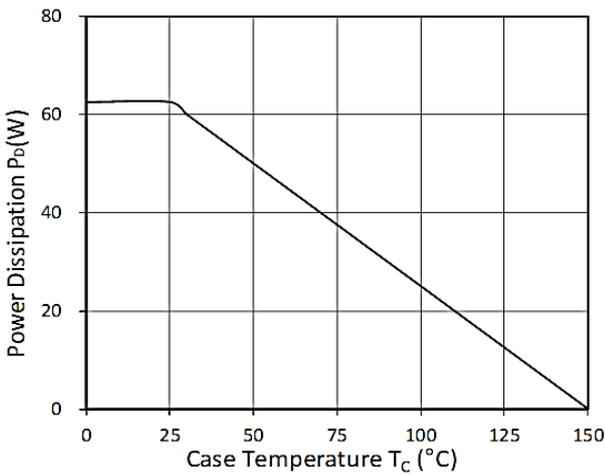


Figure 9. Power Dissipation

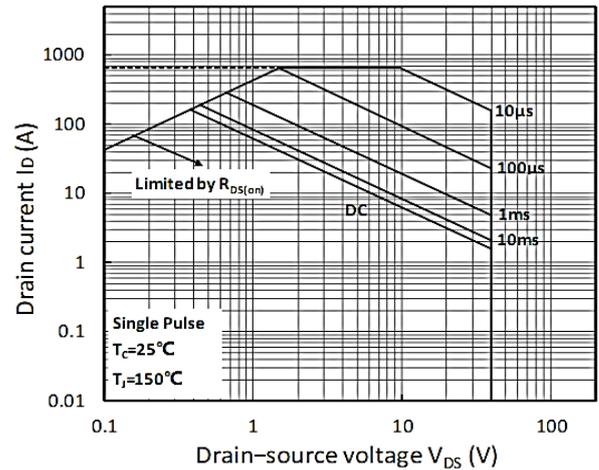


Figure 10. Safe Operating Area

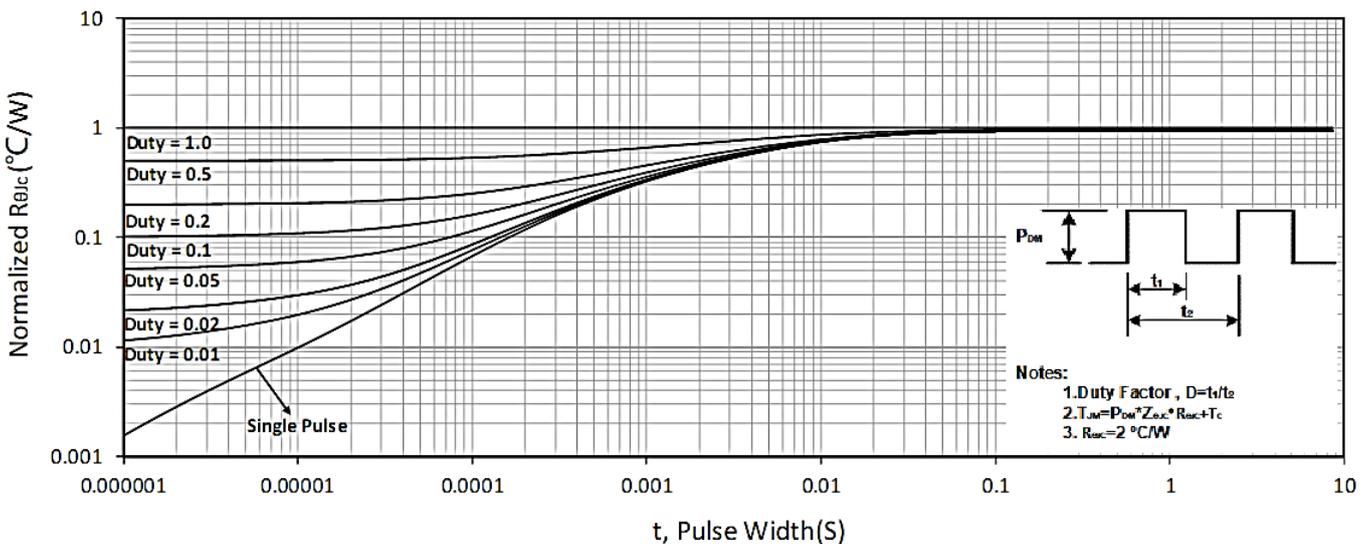
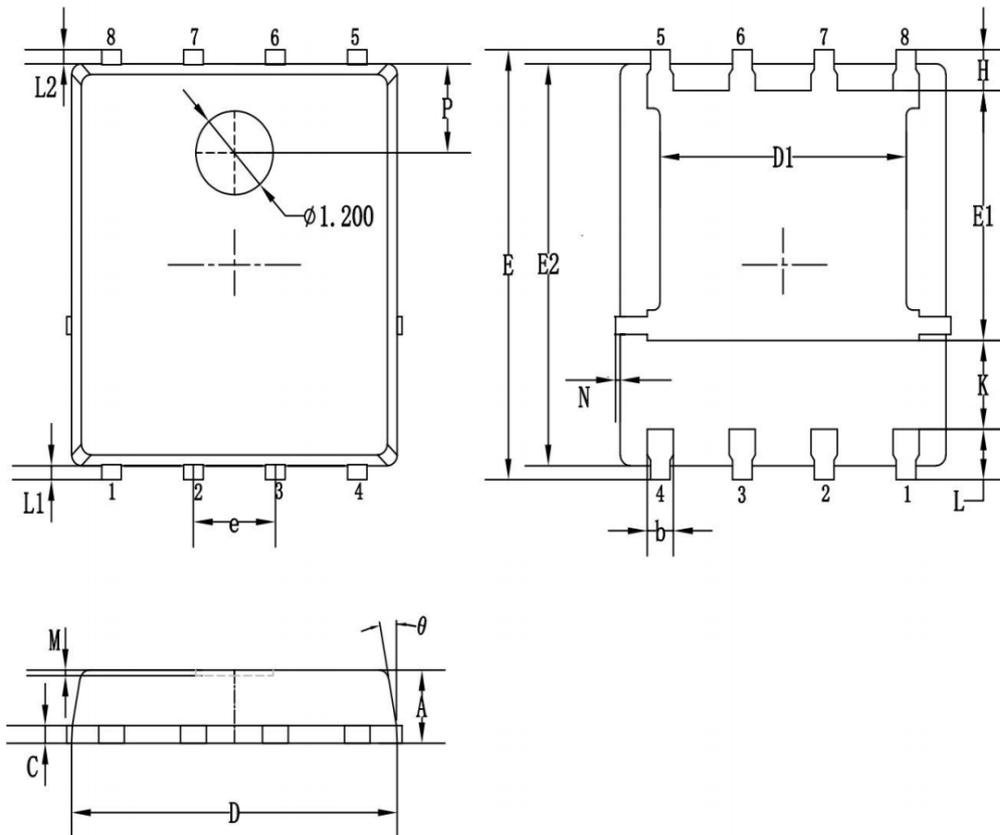


Figure 11 Normalized Maximum Transient Thermal Impedance

### Package Mechanical Data-PDFN5\*6-8L Single



Symbol	Dim in mm		
	min.	typ.	max.
A	0.9	1.05	1.2
b	0.3	0.4	0.5
C	0.2	0.25	0.35
D	4.9	5.05	5.2
D1	3.72	3.82	4.12
E	5.9	6.1	6.3
E1	3.3	3.5	3.7
E2	5.6	5.75	5.9
e	1.27BSC		
H	0.48	0.58	0.7
K	1.14	1.27	1.4
L	0.54	0.74	0.84
L1/L2	0.1	0.2	0.3
$\theta$	8°	10°	12°
M	0.08REF		
N	0		0.15
P	1.28REF		

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REV1.1	2023/11/15	Change 12 inches
REV1.2	2025/5/7	Update LOGO And Corrected Manual POD

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