

## 60V N-Channel Enhancement Mode MOSFET

### Description

The APG130N06P/T/F uses advanced **APM-SGT<sub>r</sub>** 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

$V_{DS} = 60V$   $I_D = 130A$

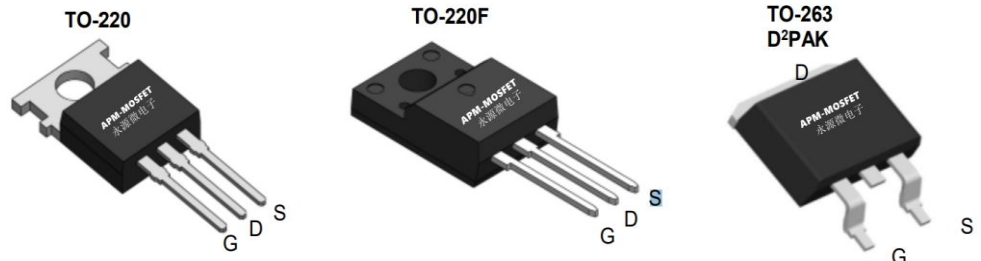
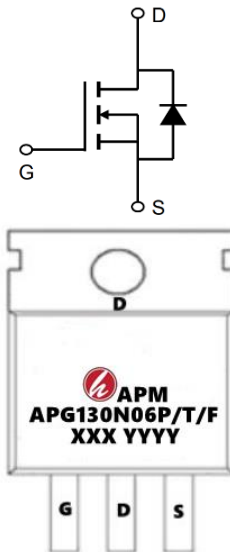
$R_{DS(ON)} < 3.5m\Omega$  @  $V_{GS}=10V$  (Type: **2.8mΩ**)

### Application

Battery protection

Load switch

Uninterruptible power supply



### Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
APG130N06P	TO-220-3L	APG130N06P XXX YYYY	1000
APG130N06T	TO-263-3L	APG130N06T XXX YYYY	800
APG130N06F	TO-220F-3L	APG130N06F XXX YYYY	1000

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

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	60	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D@T_C=25^\circ\text{C}$	Continuous Drain Current <sup>1,6</sup>	130	A
$I_D@T_C=100^\circ\text{C}$	Continuous Drain Current <sup>1,6</sup>	66	A
IDM	Pulsed Drain Current <sup>2</sup>	240	A
EAS	Single Pulse Avalanche Energy <sup>3</sup>	101	mJ
IAS	Avalanche Current	130	A
$P_D@T_C=25^\circ\text{C}$	Total Power Dissipation <sup>4</sup>	168	W
TSTG	Storage Temperature Range	-55 to 150	$^\circ\text{C}$
$T_J$	Operating Junction Temperature Range	-55 to 150	$^\circ\text{C}$
$R_{\theta JA}$	Thermal Resistance Junction-Ambient <sup>1</sup>	60	$^\circ\text{C/W}$
$R_{\theta JC}$	Thermal Resistance Junction-Case <sup>1</sup>	1.5	$^\circ\text{C/W}$

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

Symbol	Parameter	Conditions	Min	Typ	Max	Units
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> = 0V, I <sub>D</sub> =250μA	60	67		V
IDSS	Zero Gate Voltage Drain Current	V <sub>DS</sub> =60V, V <sub>GS</sub> =0V			1	μA
IGSS	Gate-Body Leakage Current	V <sub>GS</sub> = ±20V, V <sub>DS</sub> =0V			±100	nA
VGS(th)	Gate Threshold Voltage	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> =250μA	1.2	1.8	2.5	V
RDS(ON)	Static Drain-Source On-Resistance	V <sub>GS</sub> = 10V, I <sub>D</sub> =20A		2.8	3.5	mΩ
		V <sub>GS</sub> = 4.5V, I <sub>D</sub> =15A		3.2	4.0	
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, f=100KHZ		5950		pF
C <sub>oss</sub>	Output Capacitance			1250		
C <sub>rss</sub>	Reverse Transfer Capacitance			85		
Q <sub>g</sub>	Total Gate Charge	V <sub>GS</sub> =10V, V <sub>DS</sub> =50V, I <sub>D</sub> =50A		93		nC
Q <sub>gs</sub>	Gate-Source Charge			17		
Q <sub>gd</sub>	Gate-Drain Charge			14		
Q <sub>rr</sub>	Reverse Recovery Charge	I <sub>F</sub> =25A, di/dt=100A/us		73		ns
t <sub>rr</sub>	Reverse Recovery Time			68		
td(on)	Turn-on Delay Time	V <sub>GS</sub> =10V, V <sub>DD</sub> =30V, I <sub>D</sub> =25A R <sub>GEN</sub> =2Ω		22.5		ns
t <sub>r</sub>	Turn-on Rise Time			6.7		
td(off)	Turn-off Delay Time			80.3		
t <sub>f</sub>	Turn-off fall Time			26.9		
V <sub>SD</sub>	Diode Forward Voltage	I <sub>S</sub> =20A, V <sub>GS</sub> =0V			1.2	V
I <sub>S</sub>	Maximum Body-Diode Continuous Current				200	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 ≤ 300us , duty cycle ≤ 2%
- 3、 The EAS data shows Max. rating . The test condition is VDD=48V, VGS=10V, L=0.1mH IAS=130A
- 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

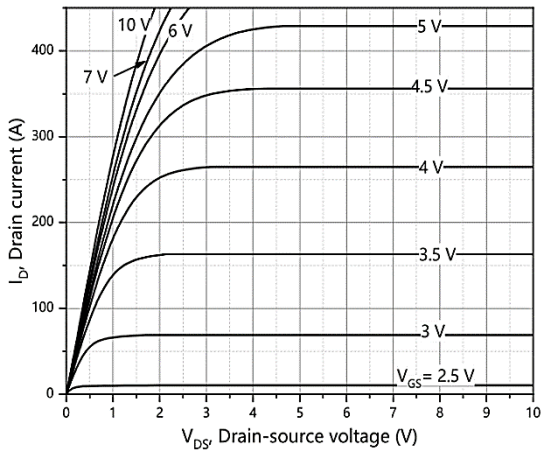


Figure 1. Typ. output characteristics

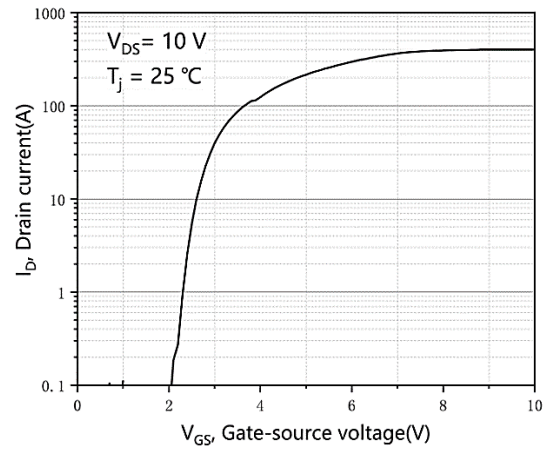


Figure 2. Typ. transfer characteristics

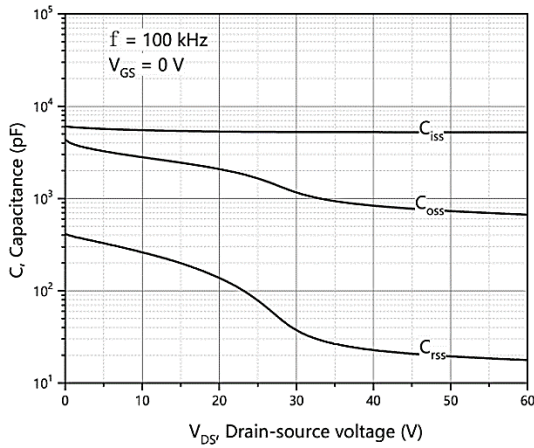


Figure 3. Typ. capacitances

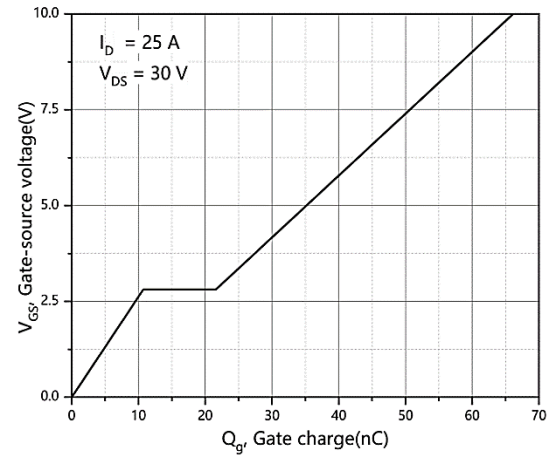


Figure 4. Typ. gate charge

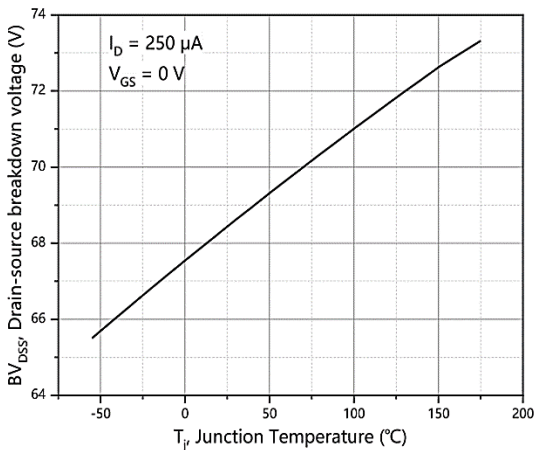


Figure 5. Drain-source breakdown voltage

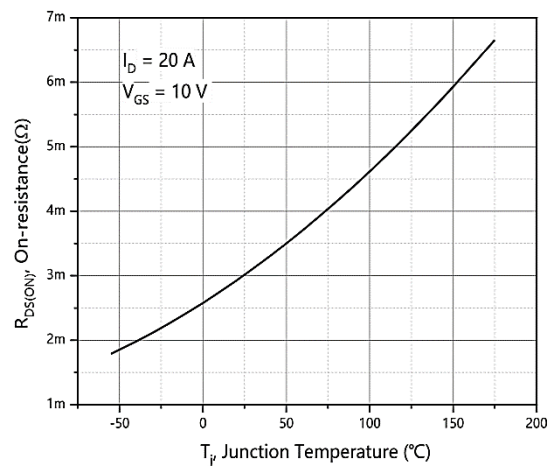


Figure 6. Drain-source on-state resistance

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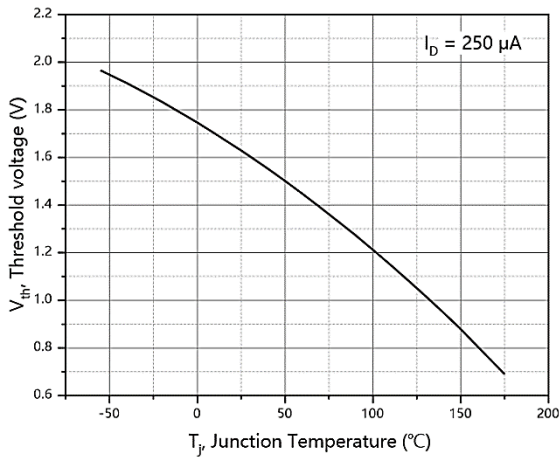


Figure 7. Threshold voltage

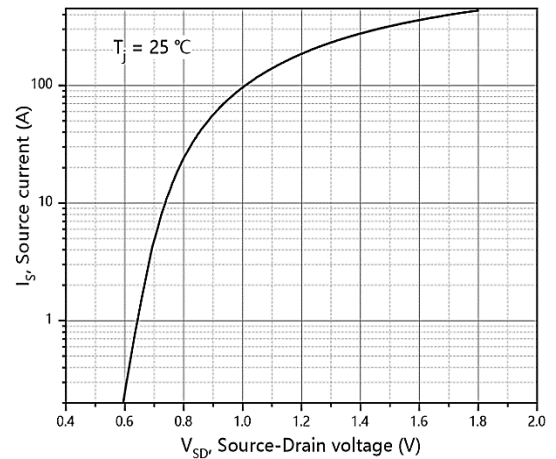


Figure 8. Forward characteristic of body diode

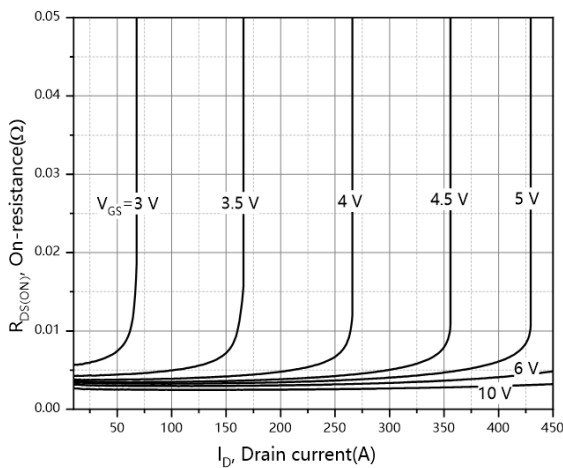


Figure 9. Drain-source on-state resistance

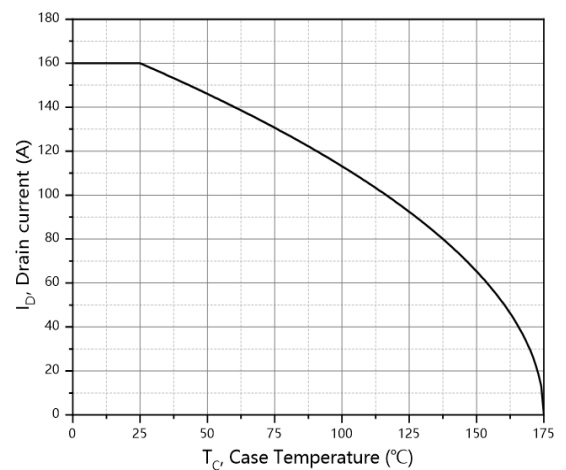


Figure 10. Drain current

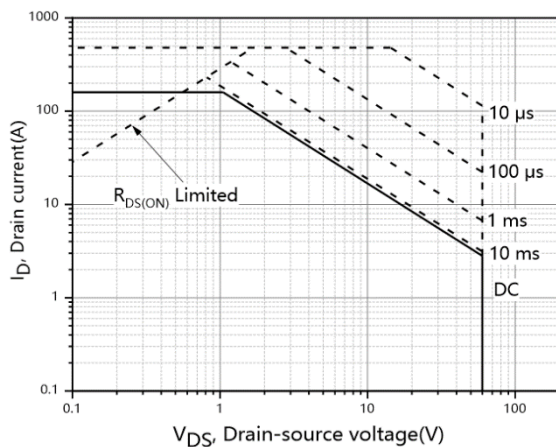


Figure 11. Safe operation area  $T_C=25\text{ }^\circ\text{C}$

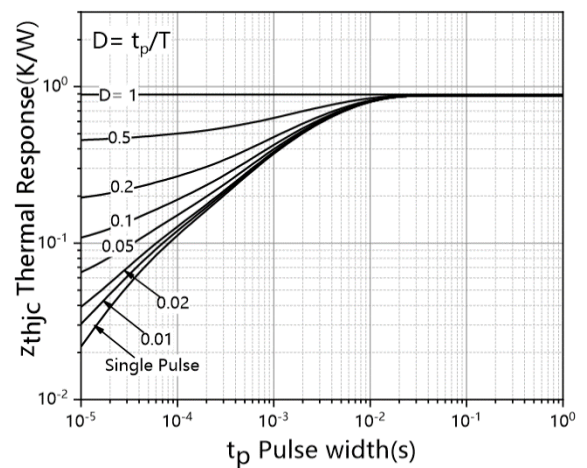
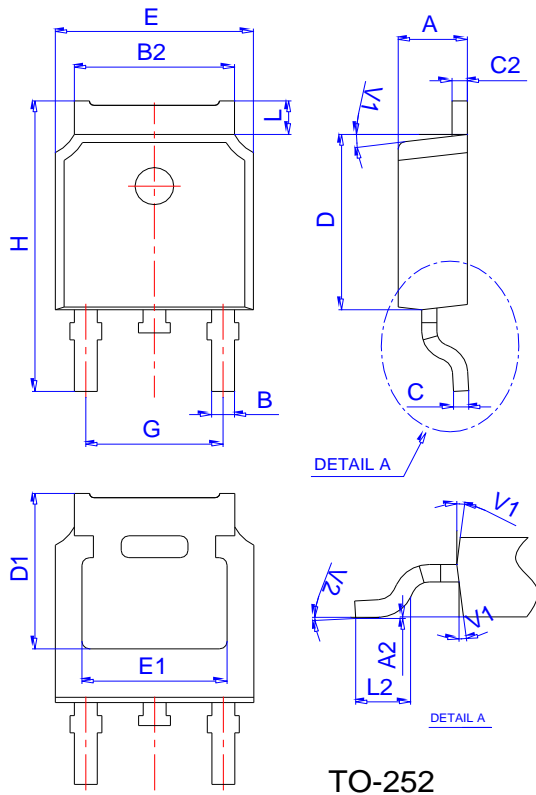


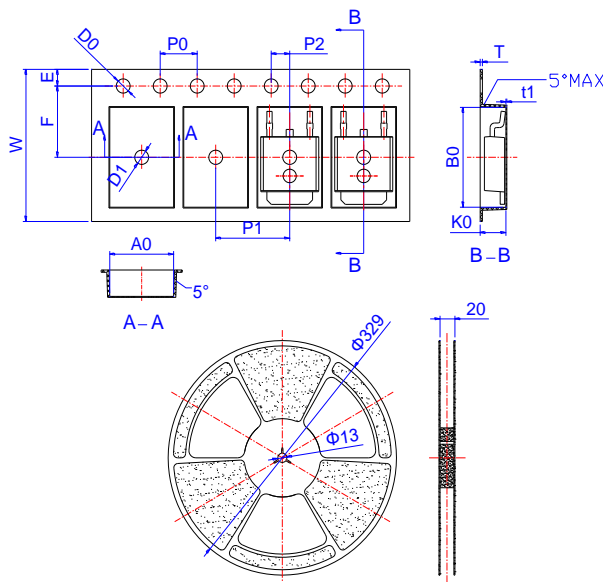
Figure 12. Max. transient thermal impedance

### Package Mechanical Data



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.10		2.50	0.083		0.098
A2	0		0.10	0		0.004
B	0.66		0.86	0.026		0.034
B2	5.18		5.48	0.202		0.216
C	0.40		0.60	0.016		0.024
C2	0.44		0.58	0.017		0.023
D	5.90		6.30	0.232		0.248
D1	5.30REF			0.209REF		
E	6.40		6.80	0.252		0.268
E1	4.63			0.182		
G	4.47		4.67	0.176		0.184
H	9.50		10.70	0.374		0.421
L	1.09		1.21	0.043		0.048
L2	1.35		1.65	0.053		0.065
V1		7°			7°	
V2		0°	6°	0°	7°	6°

### Reel Specification-TO-252



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
W	15.90	16.00	16.10	0.626	0.630	0.634
E	1.65	1.75	1.85	0.065	0.069	0.073
F	7.40	7.50	7.60	0.291	0.295	0.299
D0	1.40	1.50	1.60	0.055	0.059	0.063
D1	1.40	1.50	1.60	0.055	0.059	0.063
P0	3.90	4.00	4.10	0.154	0.157	0.161
P1	7.90	8.00	8.10	0.311	0.315	0.319
P2	1.90	2.00	2.10	0.075	0.079	0.083
A0	6.85	6.90	7.00	0.270	0.271	0.276
B0	10.45	10.50	10.60	0.411	0.413	0.417
K0	2.68	2.78	2.88	0.105	0.109	0.113
T	0.24		0.27	0.009		0.011
t1	0.10			0.004		
10P0	39.80	40.00	40.20	1.567	1.575	1.583

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<b>Edition</b>	<b>Date</b>	<b>Change</b>
Rve1.1	2018/1/31	Initial release
Rve1.2	2021/8/23	Reduce RDS(on)

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