

## 100V N-Channel Enhancement Mode MOSFET

### Description

The AP38N10D uses advanced **APM-SGT<sub>11</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

$V_{DS} = 100V$   $I_D = 38A$

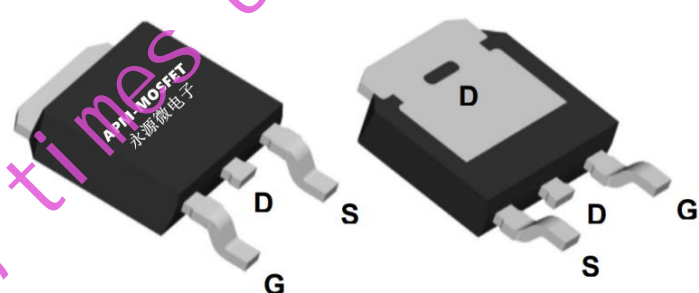
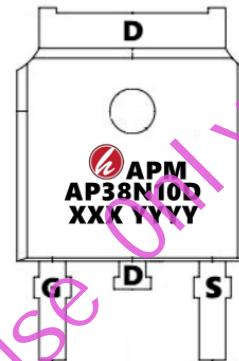
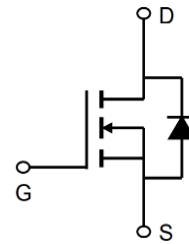
$R_{DS(ON)} < 25m\Omega$  @  $V_{GS}=10V$  (Type: **18mΩ**)

### Application

DC/DC Converter

LED Backlighting

Power Management Switches



### Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
AP38N10D	TQ-252-3L	AP38N10D XXX YYYY	2500

### Absolute Maximum Ratings (T<sub>C</sub>=25°C unless otherwise noted)

Symbol	Parameter	Rating	Units
V <sub>DS</sub>	Drain-Source Voltage	100	V
V <sub>GS</sub>	Gate-Source Voltage	±20	V
I <sub>D</sub> @T <sub>C</sub> =25°C	Continuous Drain Current, V <sub>GS</sub> @ 10V	38	A
I <sub>D</sub> @T <sub>C</sub> =100°C	Continuous Drain Current, V <sub>GS</sub> @ 10V	18	A
IDM	Pulsed Drain Current	100	A
EAS	Single Pulse Avalanche Energy	160	mJ
IAS	Avalanche Current	53.4	A
P <sub>D</sub> @T <sub>C</sub> =25°C	Total Power Dissipation <sup>4</sup>	27	W
TSTG	Storage Temperature Range	-55 to 150	°C
T <sub>J</sub>	Operating Junction Temperature Range	-55 to 150	°C
R <sub>θJA</sub>	Thermal Resistance Junction-Ambient	4.65	°C/W
R <sub>θJC</sub>	Thermal Resistance Junction-Case	62	°C/W



**100V N-Channel Enhancement Mode MOSFET****Electrical Characteristics (T<sub>c</sub>=25°C unless otherwise noted)**

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
BVDSS	Drain-Source Breakdown Voltage	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA	100	108	-	V
IDSS	Drain-Source Leakage Current	V <sub>DS</sub> = 80V, V <sub>GS</sub> = 0V	-	-	1	μA
IGSS	Gate to Body Leakage Current	V <sub>DS</sub> = 0V, V <sub>GS</sub> = ±20V	-	-	±100	nA
VGS(th)	Gate Threshold Voltage	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA	1.2	1.8	2.6	V
RDS(on)	Static Drain-Source On-Resistance	V <sub>GS</sub> = 10V, I <sub>D</sub> = 15A	-	18	25	mΩ
		V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 10A	-	28	38	mΩ
g <sub>fs</sub>	Forward Threshold Voltage	V <sub>DS</sub> = 10V, I <sub>D</sub> = 20A	-	22	-	S
R <sub>g</sub>	Gate Resistance	V <sub>DS</sub> = V <sub>GS</sub> = 0V, f = 1.0MHz	-	1.62	-	Ω
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> = 50V, V <sub>GS</sub> = 0V, f = 1.0MHz	-	322	-	pF
C <sub>oss</sub>	Output Capacitance		-	310	-	pF
C <sub>rss</sub>	Reverse Transfer Capacitance		-	23.5	-	pF
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> = 50V, I <sub>D</sub> = 20A, V <sub>GS</sub> = 10V	-	22.7	-	nC
Q <sub>gs</sub>	Gate-Source Charge		-	6.2	-	
Q <sub>gd</sub>	Gate-Drain("Miller") Charge		-	5.3	-	
td(on)	Turn-On Delay Time	V <sub>DS</sub> = 50V, I <sub>D</sub> = 20A, R <sub>G</sub> = 3Ω, V <sub>GS</sub> = 10V	-	15	-	ns
t <sub>r</sub>	Turn-On Rise Time		-	3.2	-	
td(off)	Turn-Off Delay Time		-	30	-	
t <sub>f</sub>	Turn-Off Fall Time		-	7.6	-	
I <sub>s</sub>	Continuous Source Current		-	-	25	A
VSD	Diode Forward Voltage	I <sub>S</sub> = 20A, V <sub>GS</sub> = 0V	-	0.88	1.0	V
t <sub>rr</sub>	Reverse Recovery Time	I <sub>SD</sub> = 20A, dI <sub>SD</sub> /dt = 100A/μs	-	45	-	ns
Q <sub>rr</sub>	Reverse Recovery Charge		-	59	-	nC

**Notes:**

- 1、The data tested by surface mounted on a 1 inch<sup>2</sup> 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 V<sub>DD</sub>=50V, V<sub>GS</sub>=10V, L=0.5mH, I<sub>AS</sub>=8A
- 4、The power dissipation is limited by 150°C junction temperature
- 5、The data is theoretically the same as I<sub>D</sub> and I<sub>DM</sub> , in real applications , should be limited by total power dissipation.

### Typical Characteristics

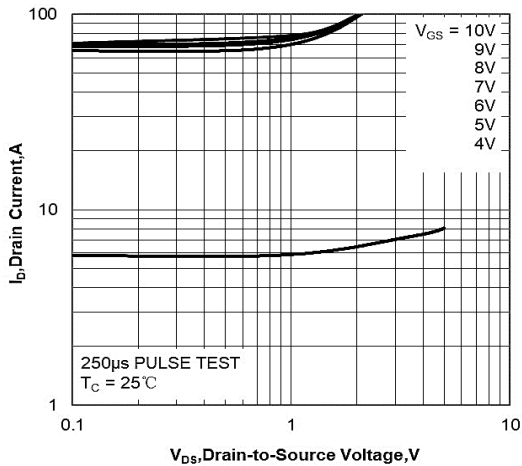


Figure 1. Output Characteristics

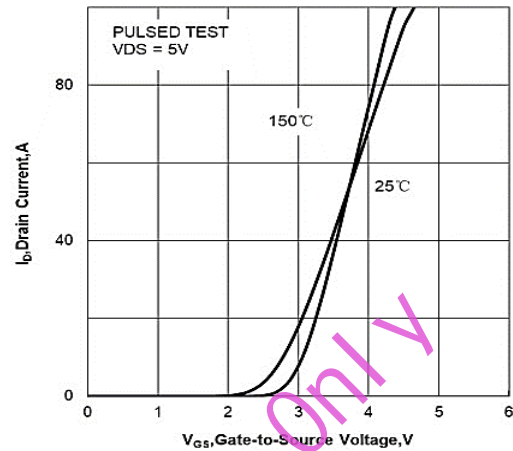


Figure 2. Transfer Characteristics

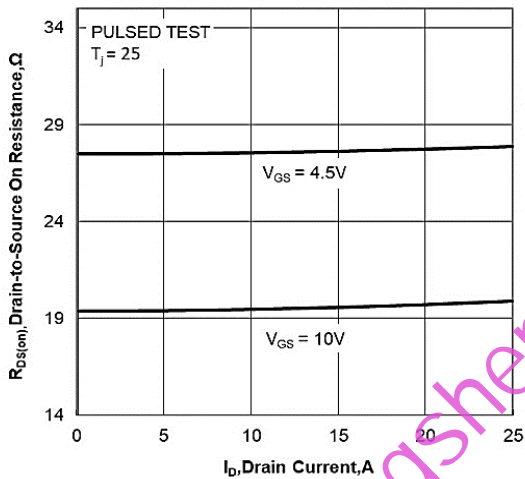


Figure 3. Drain-to-Source On Resistance vs Drain Current

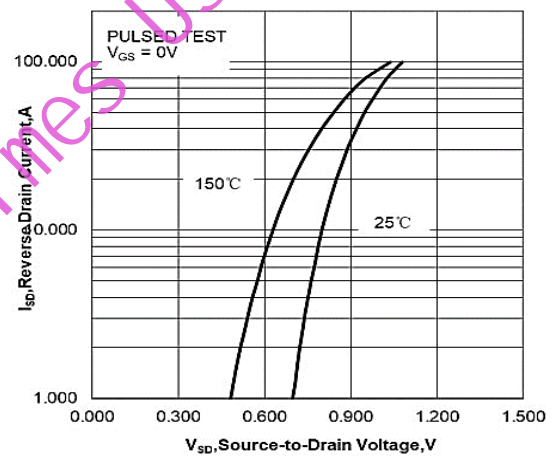


Figure 4. Body Diode Forward Voltage vs Source Current and Temperature

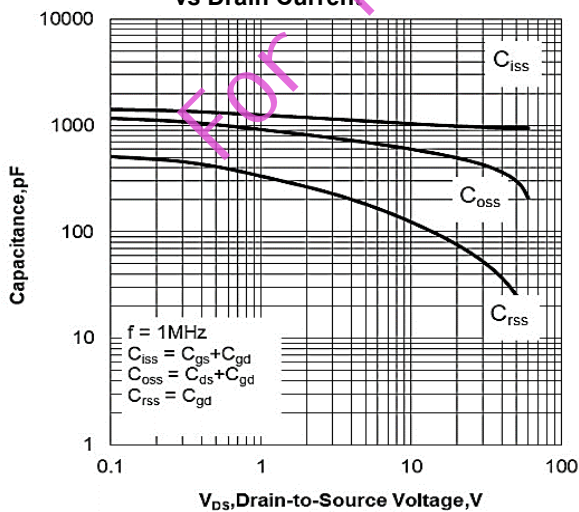


Figure 5. Capacitance Characteristics

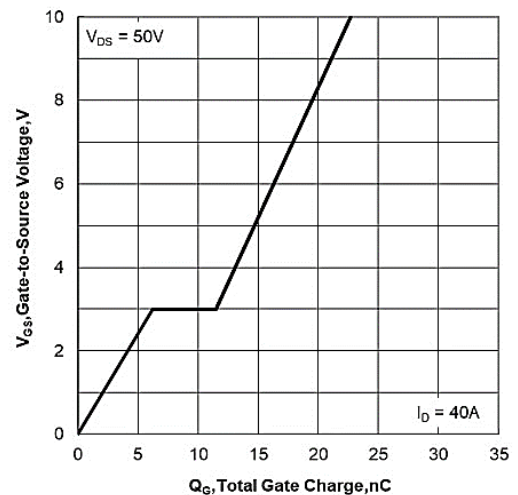


Figure 6. Gate Charge Characteristics



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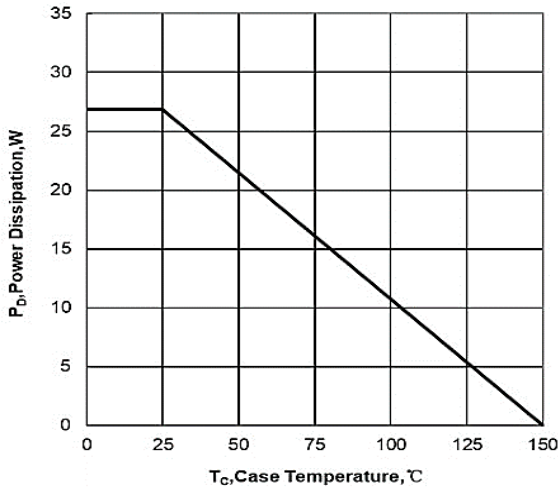


Figure 9. Maximum Continuous Drain Current vs Case Temperature

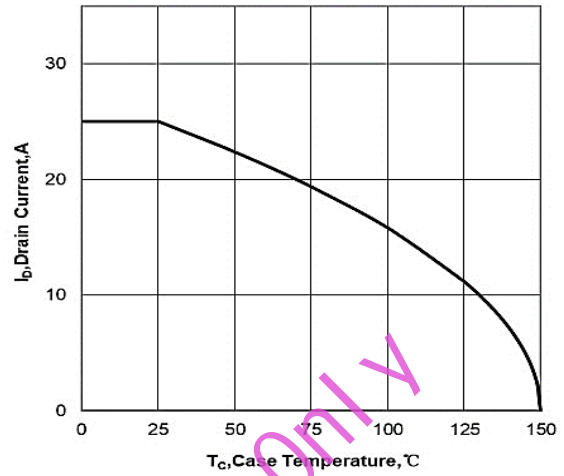


Figure 10. Maximum Power Dissipation vs Case Temperature

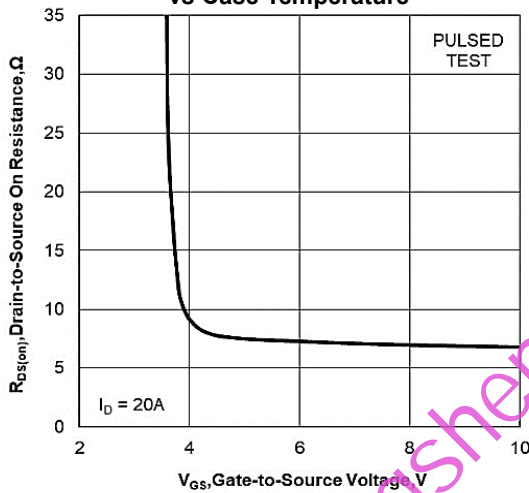


Figure 11. Drain-to-Source On Resistance vs Gate Voltage and Drain Current

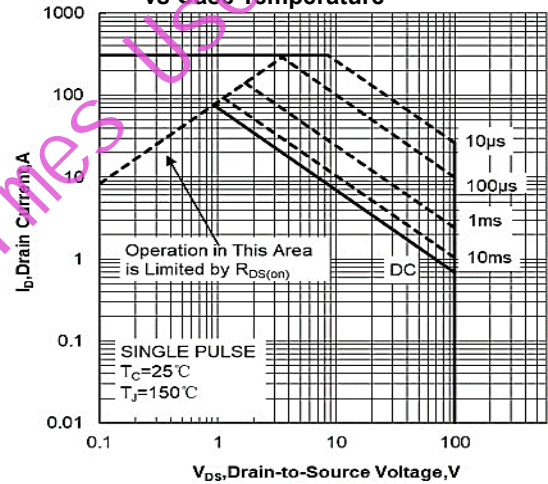


Figure 12. Maximum Safe Operating Area

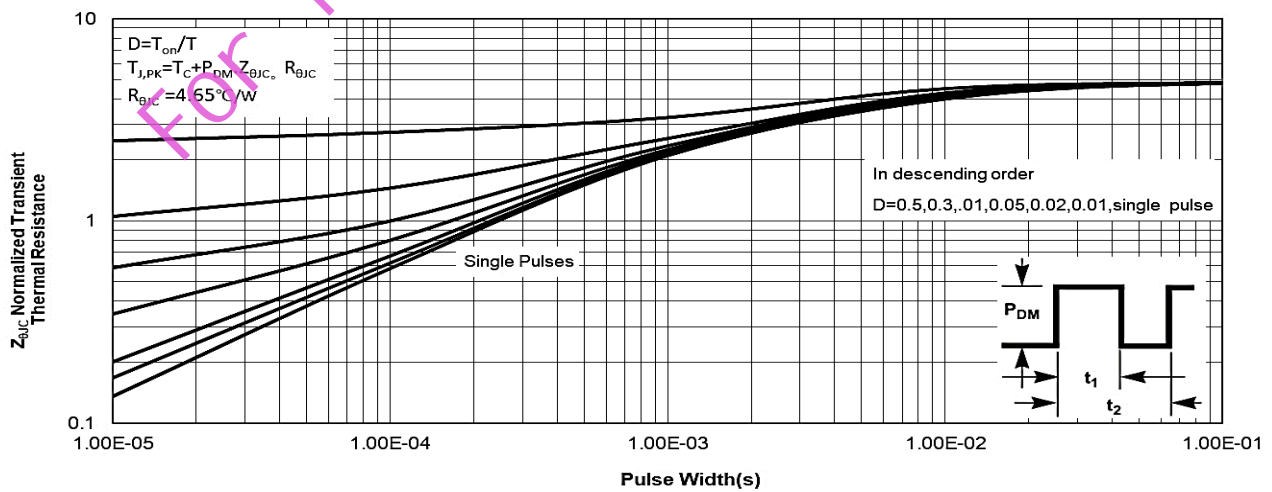
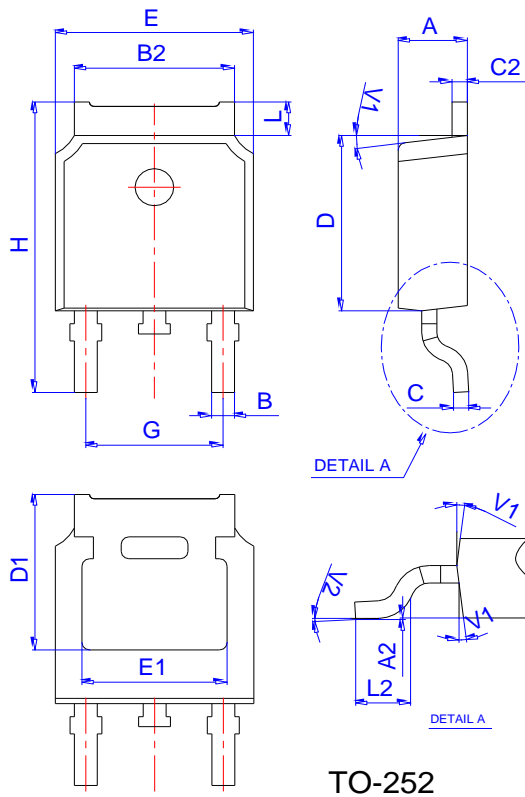


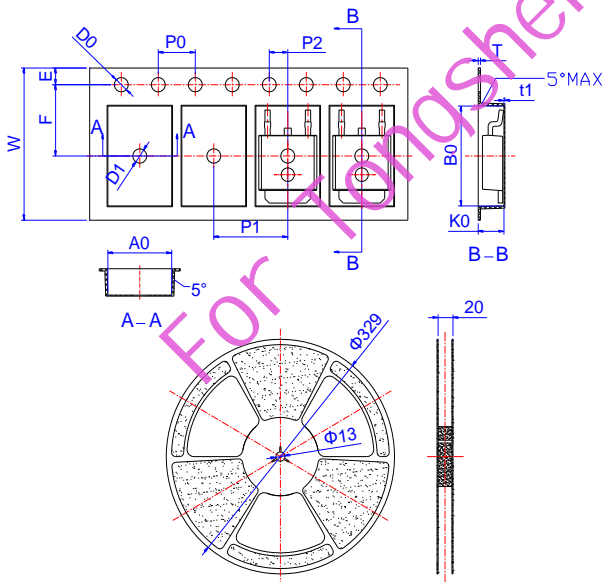
Figure 13. Maximum Effective Transient Thermal Impedance, Junction-to-Case

### 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°		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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# AP38N10D

## 100V N-Channel Enhancement Mode MOSFET

Edition	Date	Change
Rve1.0	2022/2/2	Initial release

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