

30V N-Channel Enhancement Mode MOSFET

Description

The AP90N03D uses advanced trench 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

$V_{DS} = 30V$ $I_D = 90A$

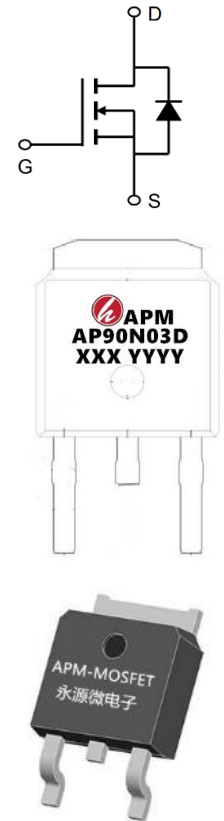
$R_{DS(ON)} < 5.5m\Omega$ @ $V_{GS}=10V$

Application

Battery protection

Load switch

Uninterruptible power supply



Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
AP90N03D	TO-252-3L	AP90N03D XXX YYYY	2500

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

Symbol	Parameter	Limit	Unit
V_{DS}	Drain-source Voltage	30	V
V_{GS}	Gate-source Voltage	± 20	V
$I_D@T_C=25^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10V^1$	90	A
$I_D@T_C=100^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10V^1$	52.8	A
I_{DM}	Pulsed Drain Current ^A	190	A
$P_D@T_C=25^\circ\text{C}$	Total Power Dissipation ⁴	54	W
$P_D@T_A=25^\circ\text{C}$	Total Power Dissipation ⁴	27	W
E_{AS}	Single Pulse Avalanche Energy ^B	225	mJ
$R_{\theta JC}$	Thermal Resistance Junction-to-Case ^C	2.8	$^\circ\text{C} / \text{W}$
T_J, T_{STG}	Junction and Storage Temperature Range	$-55 \sim +175$	$^\circ\text{C}$

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

Symbol	Parameter	Conditions	Min	Typ	Max	Units
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} = 0V, I _D =250μA	30	32		V
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D =250μA	1.0	1.4	2.5	V
R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} = 10V, I _D =15A		3.9	5.5	mΩ
		V _{GS} = 4.5V, I _D =15A		4.7	6.0	
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =30V, V _{GS} =0V			1	μA
I _{GSS}	Gate-Body Leakage Current	V _{GS} = ±20V, V _{DS} =0V			±100	nA
C _{iss}	Input Capacitance	V _{DS} =15V, V _{GS} =0V, f=1MHZ		2504		pF
C _{oss}	Output Capacitance			323		
C _{rss}	Reverse Transfer Capacitance			283		
Q _g	Total Gate Charge	V _{GS} =10V, V _{DS} =15V, I _D =20A		54		nC
Q _{gs}	Gate-Source Charge			8.5		
Q _{gd}	Gate-Drain Charge			10.2		
Q _{rr}	Reverse Recovery Charge	I _F =20A, di/dt=100A/us		6.5		ns
t _{rr}	Reverse Recovery Time			15.1		
t _{D(on)}	Turn-on Delay Time	V _{GS} =10V, V _{DD} =20V, I _D =2A, R _{GEN} =3Ω		11.4		ns
t _r	Turn-on Rise Time			20.4		
t _{D(off)}	Turn-off Delay Time			41		
t _f	Turn-off fall Time			25		
V _{SD}	Diode Forward Voltage	I _S =20A, V _{GS} =0V		0.8	1.2	V
I _S	Maximum Body-Diode Continuous Current				80	A

Note :

- 1、The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper.
- 2、The data tested by pulsed , pulse width .The EAS data shows Max. rating .
- 3、The test cond ≡ 300us , duty cycle ition is V_{DD=25} ≡ V, V 2%_{GS} =10V, L=0.1mH, I_{AS}=52.8A
- 4、The power dissipation is limited by 175°C junction temperature
- 5、The data is theoretically the same as ID and IDM , in real applications , should be limited by total power dissipation.

Typical Characteristics

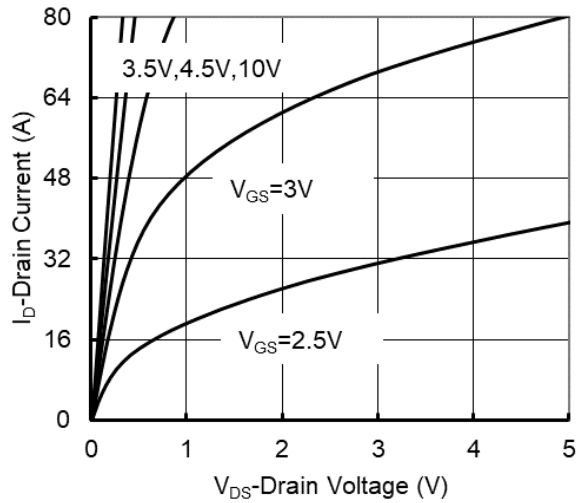


Figure 1. Output Characteristics

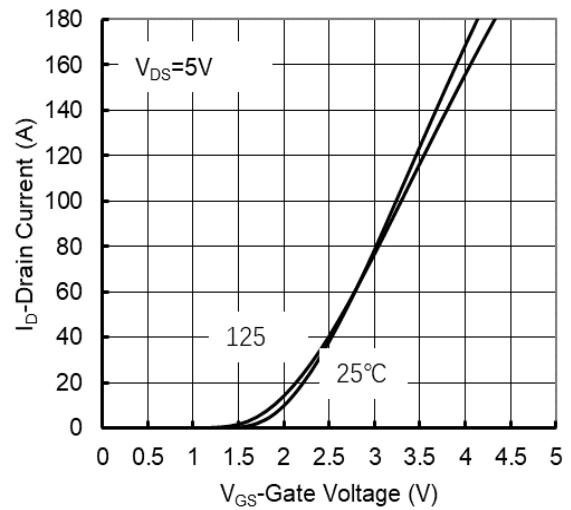


Figure 2. Transfer Characteristics

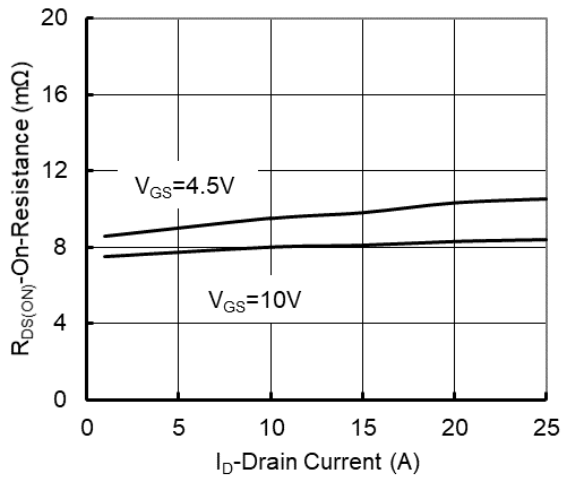


Figure 3. On-Resistance vs. Drain Current and Gate Voltage

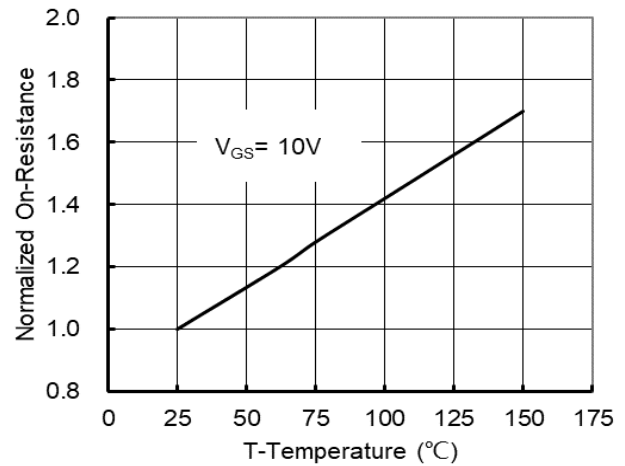


Figure 4. On-Resistance vs. Junction Temperature

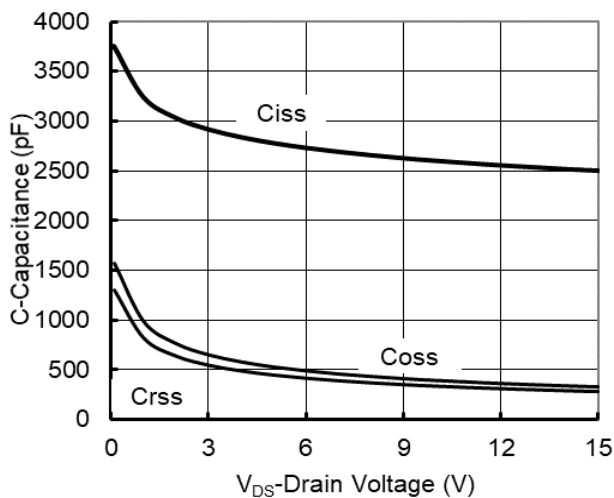


Figure 5. Capacitance Characteristics

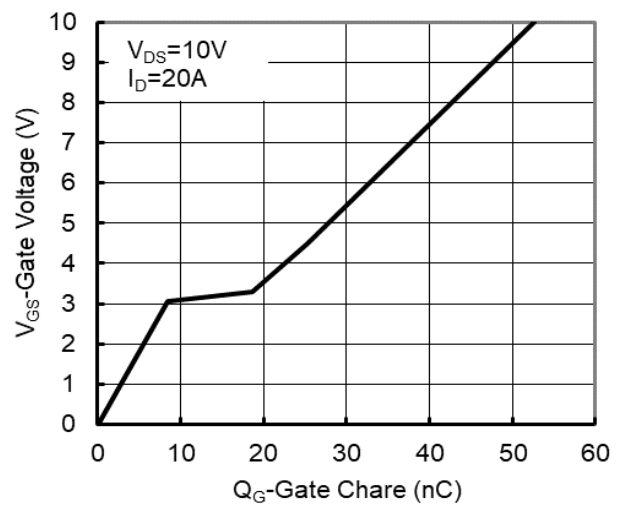


Figure 6. Gate Charge

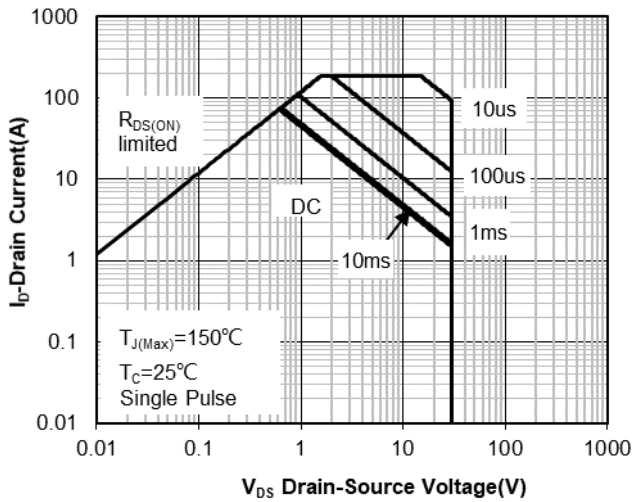


Figure 7. Safe Operation Area

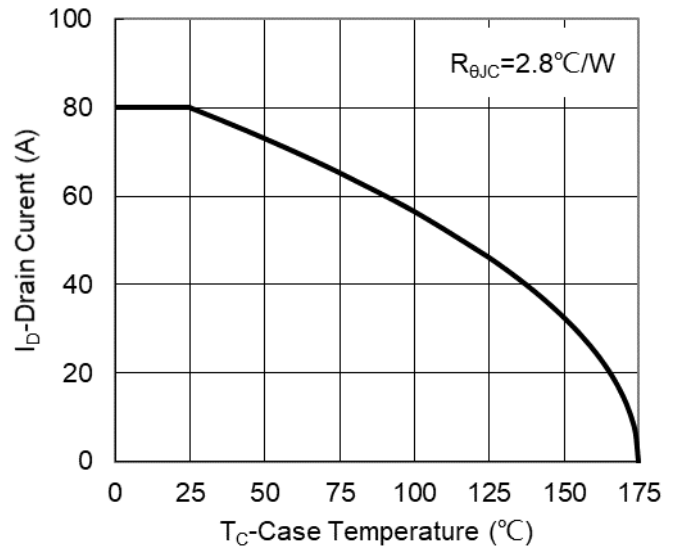


Figure 8. Maximum Continuous Drain Current vs Case Temperature

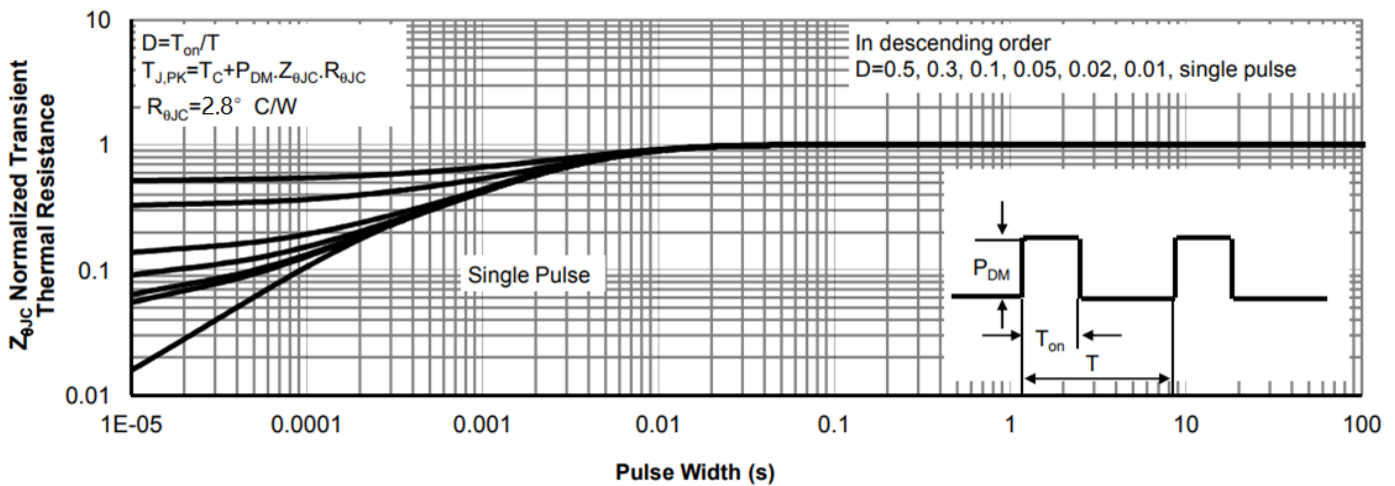
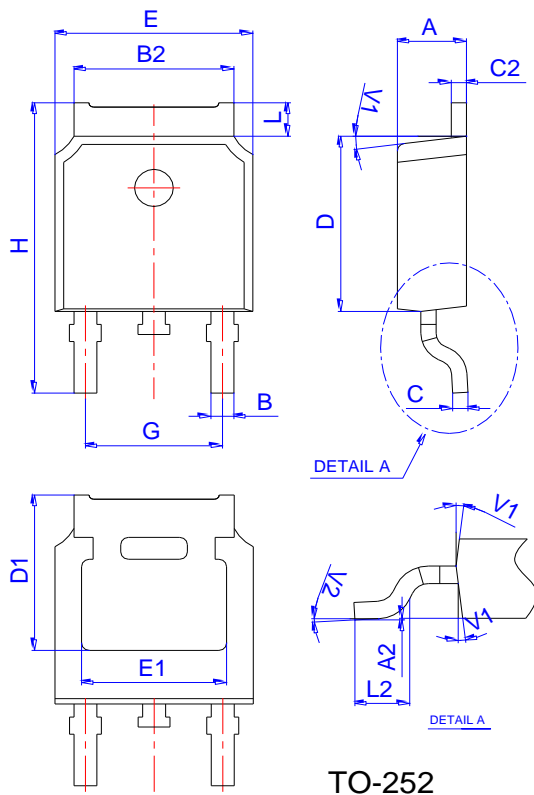


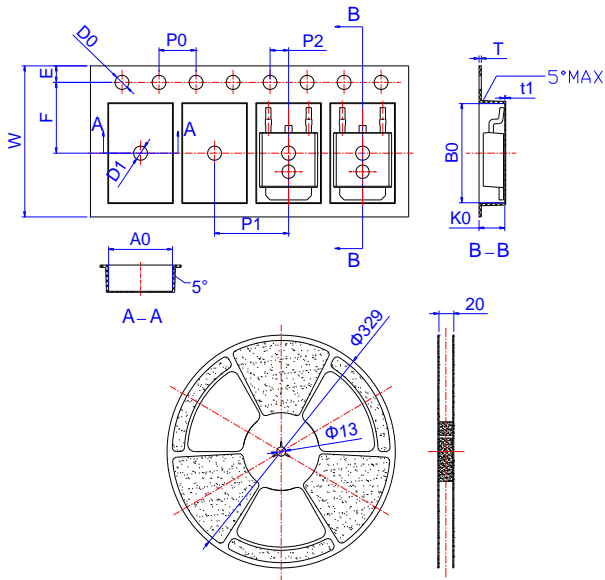
Figure 9. Normalized Maximum Transient Thermal Impedance

Package Mechanical Data: TO-252-3L



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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Edition	Date	Change
RVE1.0	2020/9/01	Initial release

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