

30V N-Channel Enhancement Mode MOSFET

Description

The AP100N03D 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

$V_{DS} = 30V$ $I_D = 100A$

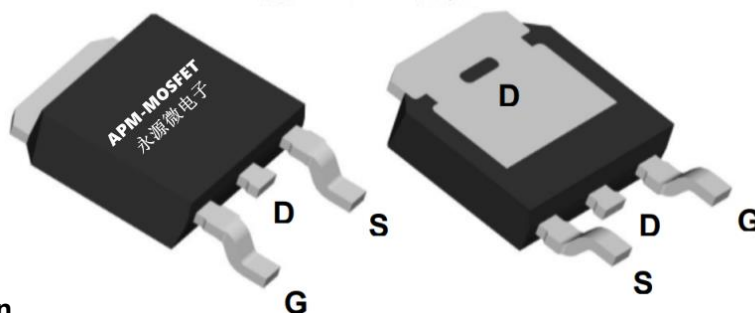
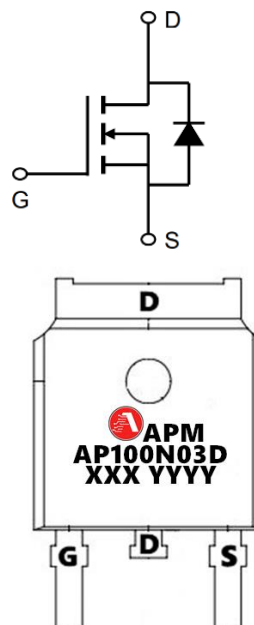
$R_{DS(ON)} < 4.2m\Omega$ @ $V_{GS}=10V$ (Type: 3.1m Ω)

Application

Battery protection

Load switch

Uninterruptible power supply



Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
AP100N03D	TO-252-3L	AP100N03D XXX YYYY	2500

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

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	30	V
V_{GS}	Gate-Source Voltage	± 20	V
$I_D @ T_C=25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	100	A
$I_D @ T_C=100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	59	A
IDM	Pulsed Drain Current ²	360	A
EAS	Single Pulse Avalanche Energy ³	325	mJ
IAS	Avalanche Current	48	A
$P_D @ T_C=25^\circ C$	Total Power Dissipation ⁴	59	W
TSTG	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	62.5	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance Junction-Case ¹	2.2	$^\circ C/W$

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

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BVDSS	Drain-Source Breakdown Voltage	$V_{GS}=0V$, $I_D=250\mu A$	30	33	---	V
RDS(ON)	Static Drain-Source On-Resistance	$V_{GS}=10V$, $I_D=30A$	---	3.1	4.2	m Ω
		$V_{GS}=4.5V$, $I_D=15A$	---	4.9	6.0	
VGS(th)	Gate Threshold Voltage	$V_{GS}=V_{DS}$, $I_D=250\mu A$	1.0	1.6	2.5	V
$\Delta V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	-6.16	---	mV/ $^{\circ}\text{C}$
IDSS	Drain-Source Leakage Current	$V_{DS}=24V$, $V_{GS}=0V$, $T_J=25^{\circ}\text{C}$	---	---	1	uA
		$V_{DS}=24V$, $V_{GS}=0V$, $T_J=55^{\circ}\text{C}$	---	---	5	
IGSS	Gate-Source Leakage Current	$V_{GS}=\pm 20V$, $V_{DS}=0V$	---	---	± 100	nA
gfs	Forward Transconductance	$V_{DS}=5V$, $I_D=30A$	---	22	---	S
Rg	Gate Resistance	$V_{DS}=0V$, $V_{GS}=0V$, $f=1\text{MHz}$	---	1.7	3.4	Ω
Qg	Total Gate Charge (4.5V)	$V_{DS}=15V$, $V_{GS}=4.5V$, $I_D=15A$	---	20	---	nC
Qgs	Gate-Source Charge		---	7.6	---	
Qgd	Gate-Drain Charge		---	7.2	---	
Td(on)	Turn-On Delay Time	$V_{DD}=15V$, $V_{GS}=10V$, $R_G=3.3\Omega$, $I_D=15A$	---	7.8	---	ns
Tr	Rise Time		---	15	---	
Td(off)	Turn-Off Delay Time		---	37.3	---	
Tf	Fall Time		---	10.6	---	
Ciss	Input Capacitance	$V_{DS}=15V$, $V_{GS}=0V$, $f=1\text{MHz}$	---	2295	---	pF
Coss	Output Capacitance		---	267	---	
Crss	Reverse Transfer Capacitance		---	210	---	
Is	Continuous Source Current ^{1,5}	$V_G=V_D=0V$, Force Current	---	---	80	A
ISM	Pulsed Source Current ^{2,5}		---	---	160	A
VSD	Diode Forward Voltage ²	$V_{GS}=0V$, $I_S=1A$, $T_J=25^{\circ}\text{C}$	---	---	1	V
trr	Reverse Recovery Time	$I_F=30A$, $dI/dt=100A/\mu s$, $T_J=25^{\circ}\text{C}$	---	14	---	nS
Qrr	Reverse Recovery Charge		---	5	---	nC

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 $\leq 300\mu s$, duty cycle $\leq 2\%$
- 3、The EAS data shows Max. rating . The test condition is $V_{DD}=24V$, $V_{GS}=10V$, $L=0.5mH$, $I_{AS}=58A$
- 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

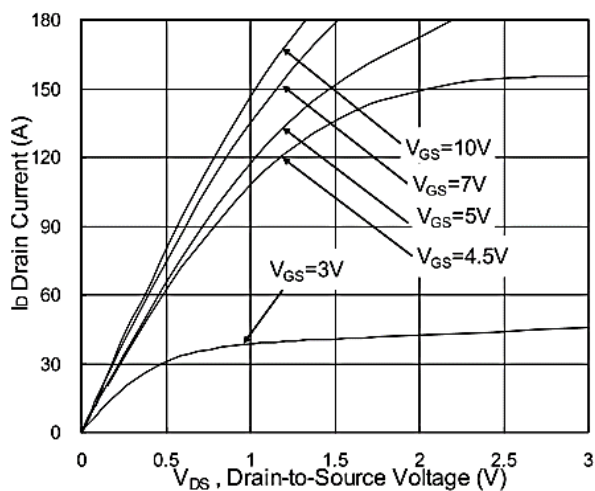


Fig.1 Typical Output Characteristics

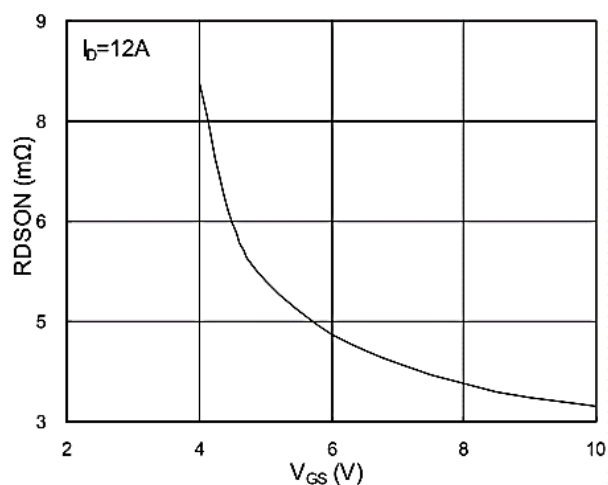


Fig.2 On-Resistance vs. G-S Voltage

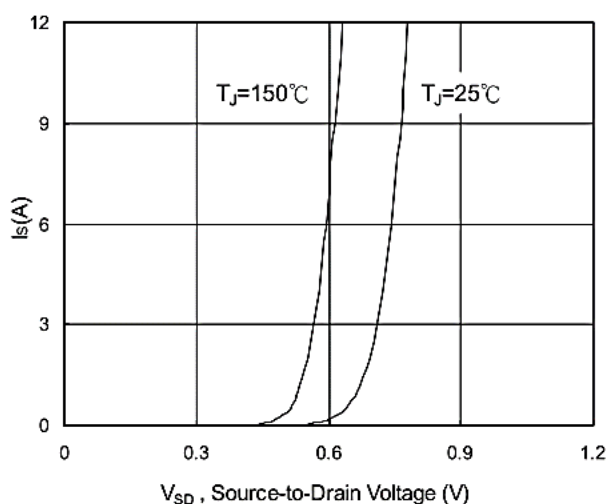


Fig.3 Forward Characteristics of Reverse

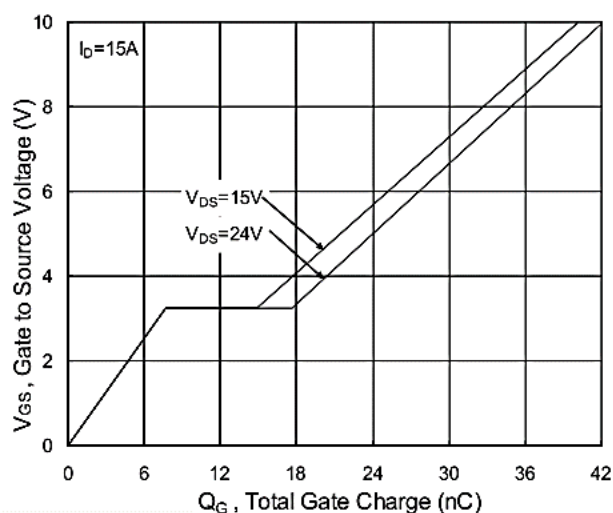


Fig.4 Gate-Charge Characteristics

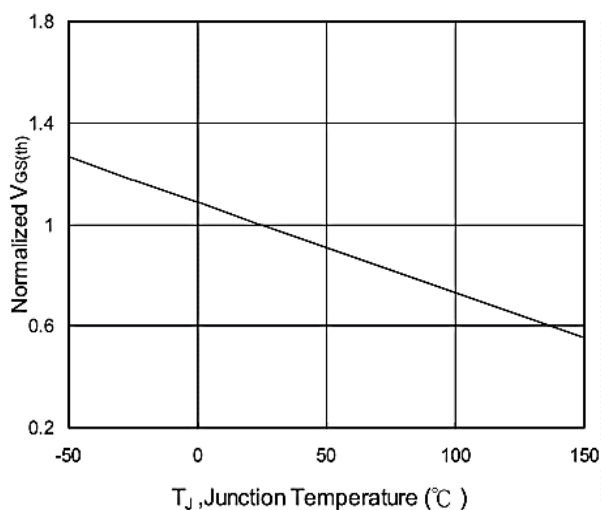


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

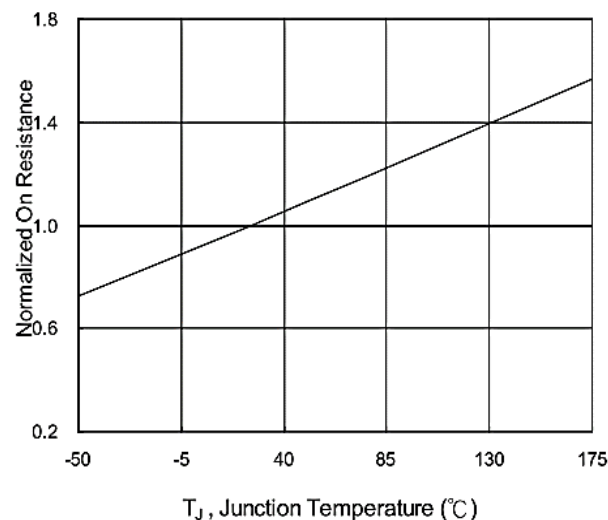


Fig.6 Normalized $R_{DS(on)}$ vs. T_J

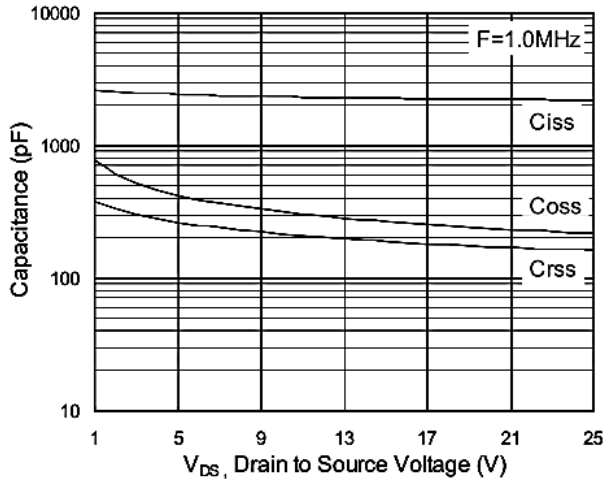


Fig.7 Capacitance

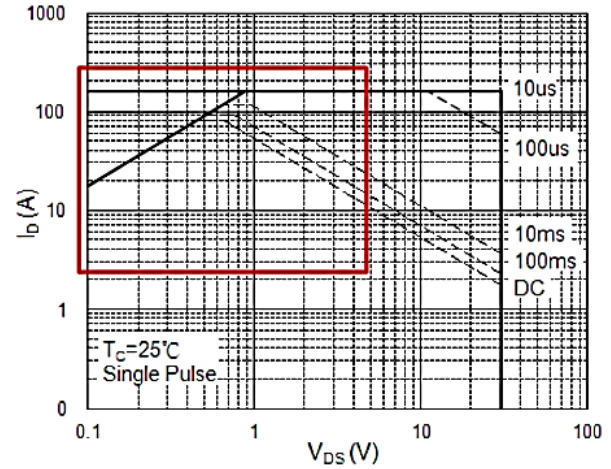


Fig.8 Safe Operating Area

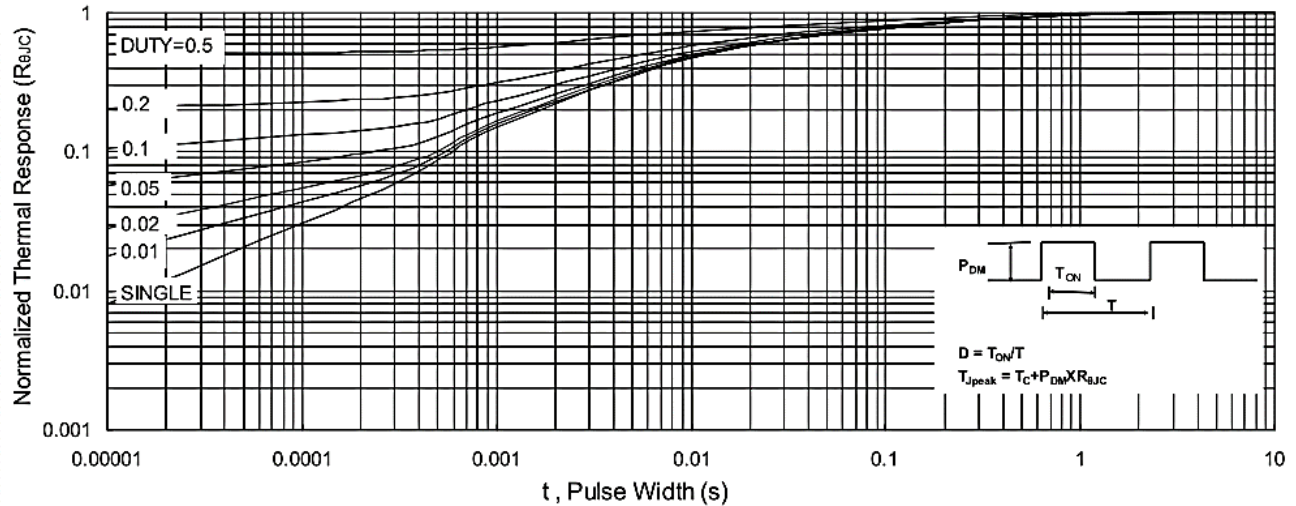


Fig.9 Normalized Maximum Transient Thermal Impedance

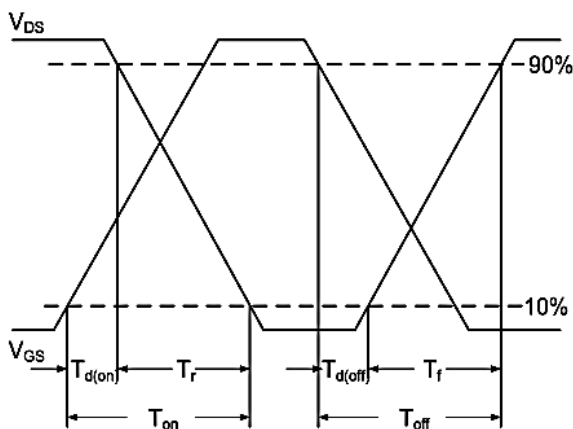


Fig.10 Switching Time Waveform

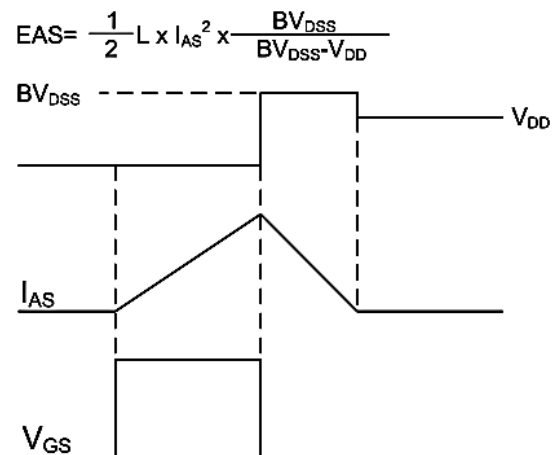
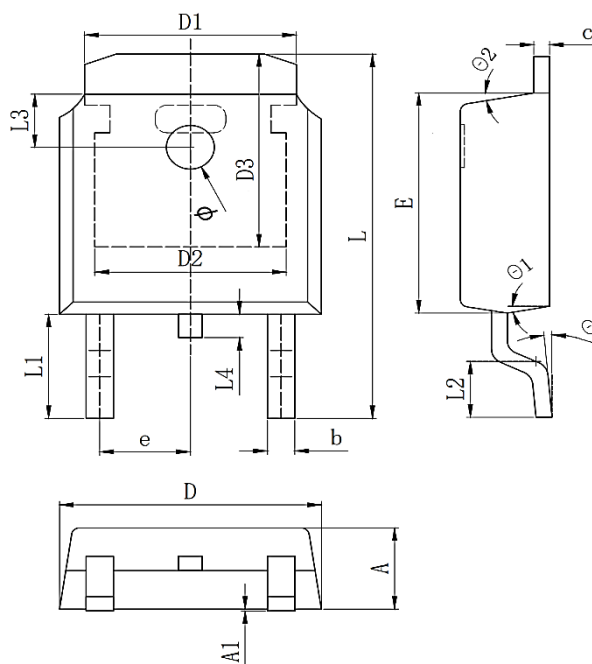


Fig.11 Unclamped Inductive Switching Waveform

Package Mechanical Data-TO-252-3L



Symbol	Dim in mm		
	Min	Typ	Max
A	2.1	2.3	2.5
A1	0	0.064	0.128
b	0.64	0.75	0.86
c	0.45	0.52	0.6
D	6.4	6.6	6.8
D1	5.33REF		
D2	4.83REF		
D3	5.25REF		
E	5.9	6.1	6.3
e	2.286TYP		
L	9.8	10.1	10.4
L1	2.888REF		
L2	1.4	1.5	1.7
L3	1.65REF		
L4	0.6	0.8	1
φ	1.1	1.2	1.3
θ	0°		10°
θ1	5°		10°
θ2	5°		10°

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Edition	Date	Change
REV3.8	2018/1/31	Initial release
REV3.9	2019/12/01	Reduce internal RDS
REV4.0	2020/5/02	Change of specification format
REV4.1	2022/9/22	Reduce internal RDS
REV4.2	2024/10/22	Reduce internal RDS

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