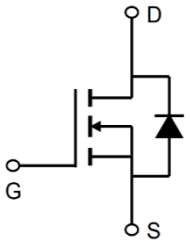
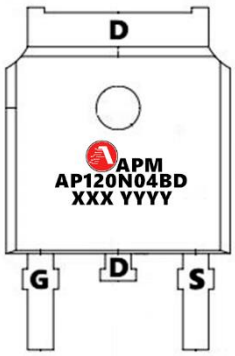
AP120N04BD

40V N-Channel Enhancement Mode MOSFET

Description

The AP120N04BD 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} = 40V I_D =120A

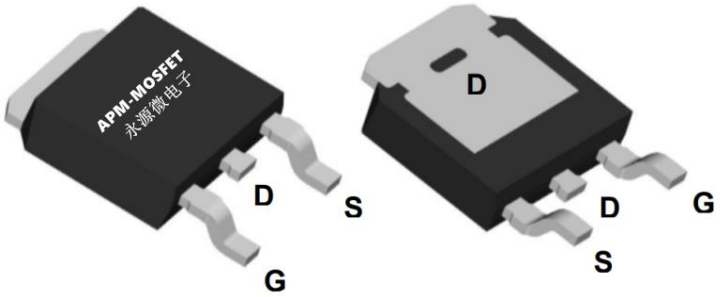
$R_{DS(ON)}$ < 3.8mΩ @ V_{GS}=10V **(Type：2.8mΩ)**

Application

Battery protection

Load switch

Uninterruptible power supply



Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
AP120N04BD	TO-252-3L	AP120N04BD XXX YYYY	2500

Absolute Maximum Ratings@T_j=25°C(unless otherwise specified)

Symbol	Parameter	Rating	Units
VDS	Drain-Source Voltage	40	V
VGS	Gate-Source Voltage	±20	V
I_D@T_C=25℃	Continuous Drain Current, V_{GS} @ 10V[1]	120	A
I_D@T_C=100℃	Continuous Drain Current, V_{GS} @ 10V[1]	88	A
IDM	Pulsed Drain Current[2]	440	A
EAS	Single Pulse Avalanche Energy[3]	395	mJ
IAS	Avalanche Current	42	A
P_D@T_C=25℃	Total Power Dissipation[4]	108	W
TSTG	Storage Temperature Range	-55 to 150	℃
T_J	Operating Junction Temperature Range	-55 to 150	℃
$R_{\theta}JA$	Thermal Resistance Junction-Ambient [1]	62	℃/W
$R_{\theta}JC$	Thermal Resistance Junction-Case[1]	1.4	℃/W

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Electrical Characteristics (T_J=25℃, unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BVDSS	Drain-Source Breakdown Voltage	V_{GS}=0V , I_D=250uA	40	44	---	V
△BVDSS/△TJ	BV_{DSS} Temperature Coefficient	Reference to 25℃ , I_D=1mA	---	0.052	---	V/℃
RDS(ON)	Static Drain-Source On-Resistance[2]	V_{GS}=10V , I_D=30A	---	2.8	3.8	mΩ
RDS(ON)	Static Drain-Source On-Resistance[2]	V_{GS}=4.5V , I_D=20A	---	3.8	5.5	mΩ
VGS(th)	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =250uA	1.2	1.6	2.5	V
△$V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	-5.76	---	mV/℃
IDSS	Drain-Source Leakage Current	V_{DS}=40V , V_{GS}=0V , T_J=25℃	---	---	1	uA
		V_{DS}=40V , V_{GS}=0V , T_J=55℃	---	---	5	
IGSS	Gate-Source Leakage Current	V_{GS}=±20V , V_{DS}=0V	---	---	±100	nA
gfs	Forward Transconductance	V_{DS}=5V , I_D=30A	---	42	---	S
Q_g	Total Gate Charge (4.5V)	V_{DS}=20V , V_{GS}=10V , I_D=30A	---	65	---	nC
Qgs	Gate-Source Charge		---	12.5	---	
Qgd	Gate-Drain Charge		---	15	---	
Td(on)	Turn-On Delay Time	V_{DD}=20V , V_{GS}=10V , R_G=4.7Ω, I_D=30A	---	12	---	ns
T_r	Rise Time		---	16	---	
Td(off)	Turn-Off Delay Time		---	39	---	
T_f	Fall Time		---	15	---	
Ciss	Input Capacitance	V_{DS}=20V , V_{GS}=0V , f=1MHz	---	5595	---	pF
Coss	Output Capacitance		---	411	---	
Crss	Reverse Transfer Capacitance		---	340	---	
IS	Continuous Source Current[1,5]	V_G=V_D=0V , Force Current	---	---	120	A
ISM	Pulsed Source Current[2,5]		---	---	480	A
VSD	Diode Forward Voltage[2]	V_{GS}=0V , I_S=30A , T_J=25℃	---	---	1.2	V
trr	Reverse Recovery Time	IF=30A , dI/dt=100A/μs , T_J=25℃	---	22	---	nS
Q_{rr}	Reverse Recovery Charge		---	11	---	nC

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 . TJ=25℃, VDD=32V, VG=10V, RG=25Ω, L=0.1mH, IAS =42A

4、The power dissipation is limited by 150℃ 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

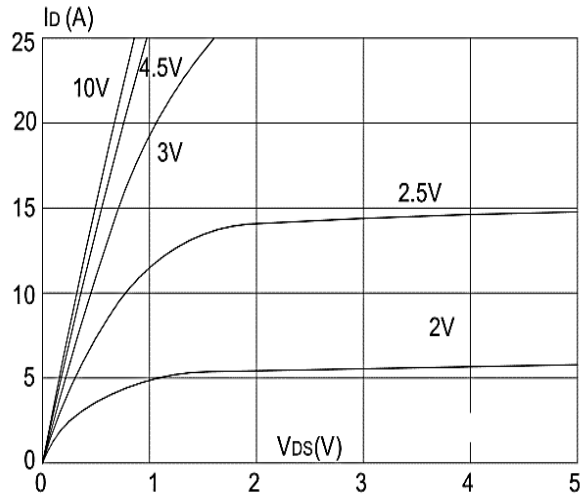


Figure1: Output Characteristics

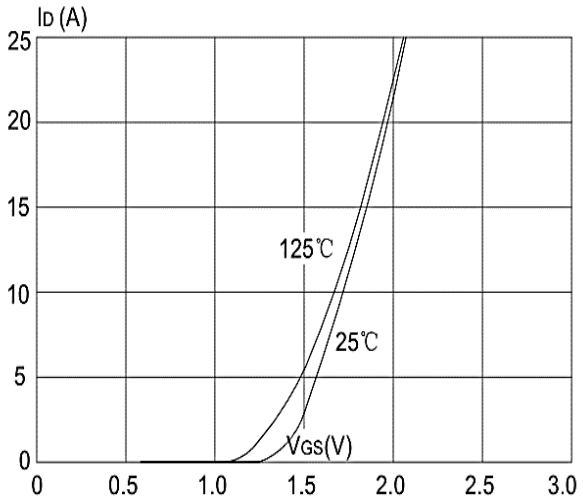


Figure 2: Typical Transfer Characteristics

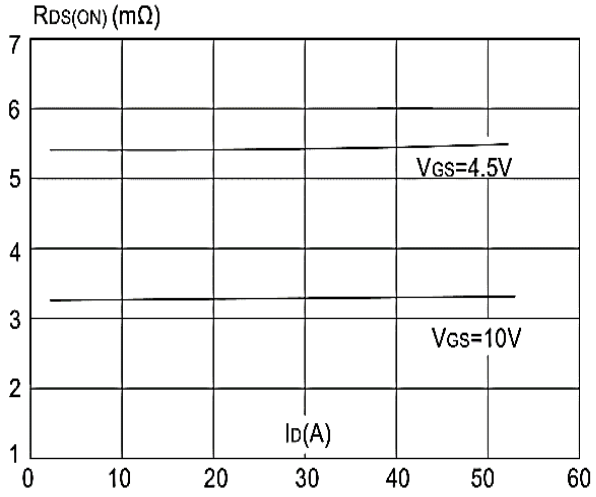


Figure 3:On-resistance vs. Drain Current

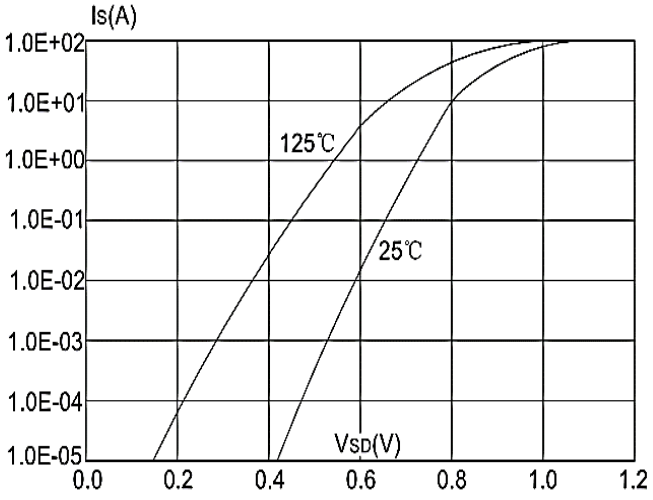


Figure 4: Body Diode Characteristics

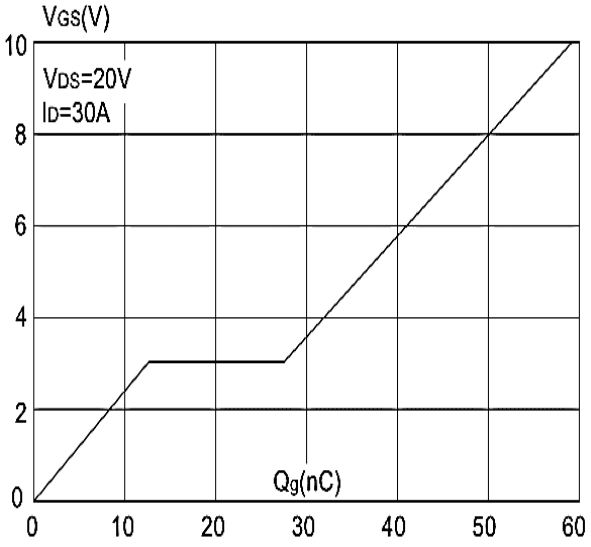


Figure 5: Gate Charge Characteristics

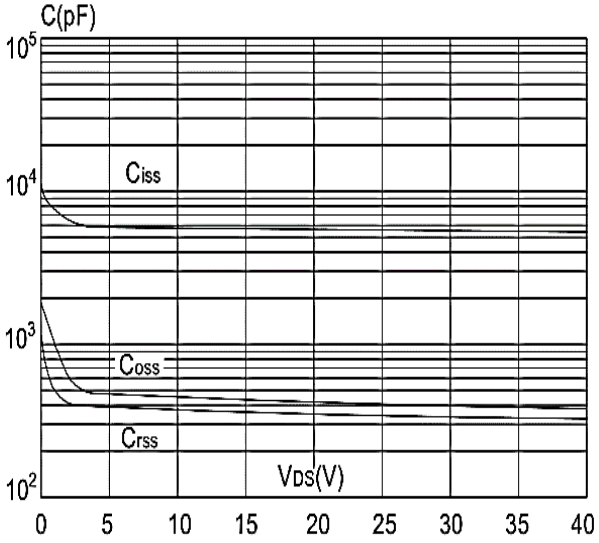


Figure 6: Capacitance Characteristics

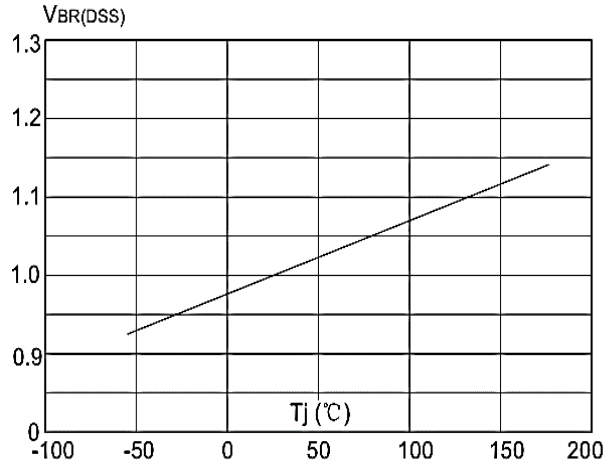


Figure 7: Normalized Breakdown Voltage vs Junction Temperature

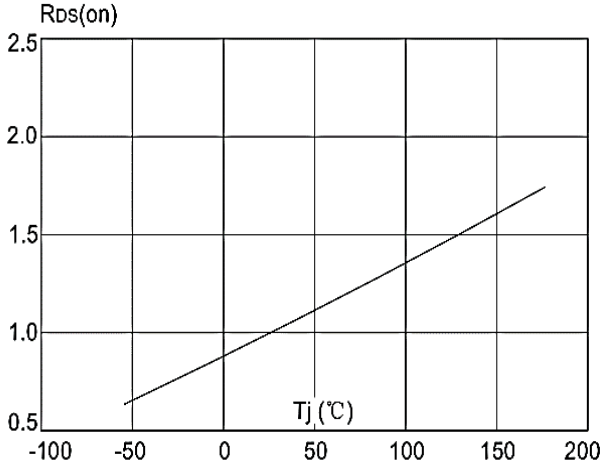


Figure 8: Normalized on Resistance vs. Junction Temperature

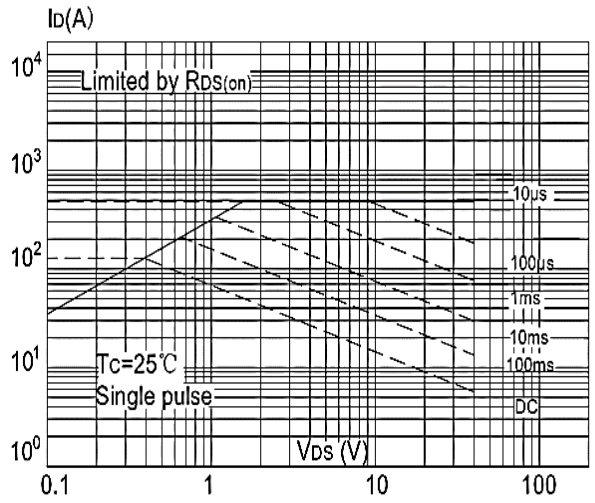


Figure 9: Maximum Safe Operating Area

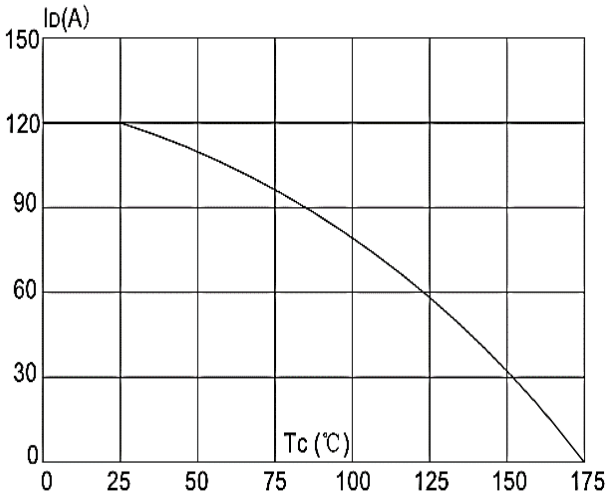


Figure 10: Maximum Continuous Drain Current vs. Ambient Temperature

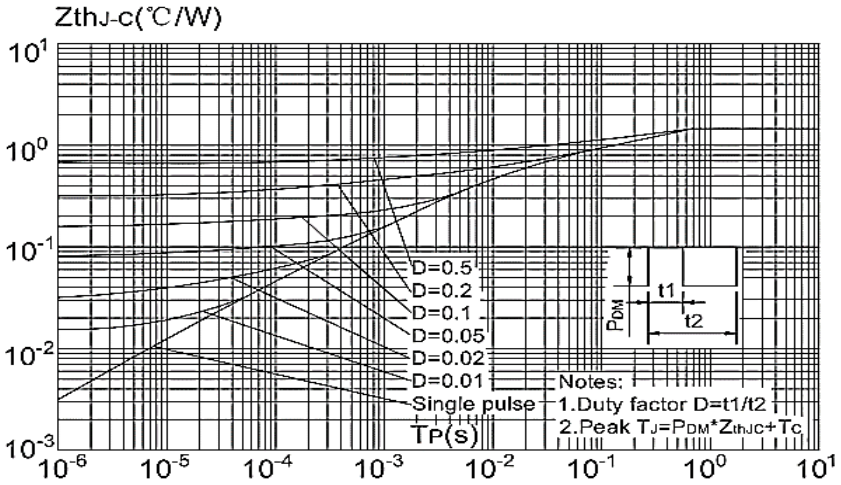
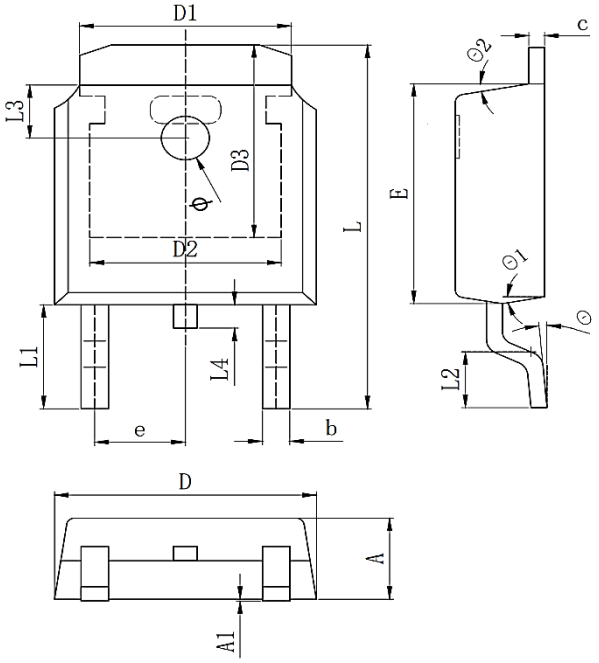


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Ambien

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
REV1.0	2024/1/31	Initial release