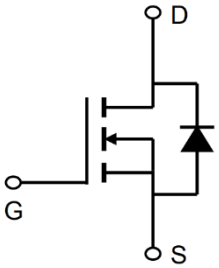
AP120N04P/T

40V N-Channel Enhancement Mode MOSFET

Description

The AP120N04P/T uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 10V. This device is suitable for use as a Battery protection or in other Switching application.



General Features

V_{DS} = 40V I_D =120 A

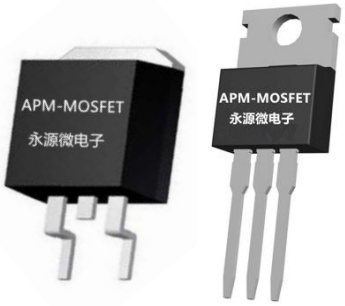
$R_{DS(ON)}$ < 4.0mΩ @ V_{GS}=10V

Application

Battery protection

Load switch

Uninterruptible power supply



Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
AP120N04P	TO-220-3L	AP120N04P XXX YYYY	10 00
AP120N04T	TO-263-3L	AP120N04T XXX YYYY	800

Absolute Maximum Ratings (T_C=25℃unless otherwise noted)

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	40	V
V_{GS}	Gate-Source Voltage	±20	V
I_D@T_C=25℃	Continuous Drain Current, V_{GS} @ 10V[1,6]	120	A
I_D@T_C=100℃	Continuous Drain Current, V_{GS} @ 10V[1,6]	98	A
I_{DM}	Pulsed Drain Current[2]	600	A
EAS	Single Pulse Avalanche Energy[3]	272	mJ
I_{AS}	Avalanche Current	33	A
P_D@T_C=25℃	Total Power Dissipation[4]	180	W
T_{STG}	Storage Temperature Range	-55 to 150	℃
T_J	Operating Junction Temperature Range	-55 to 150	℃
$R_{\theta JA}$	Thermal Resistance Junction-Ambient [1]	50	℃/W
$R_{\theta JC}$	Thermal Resistance Junction-Case[1]	0.7	℃/W

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

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
V(BR)DSS	Drain-Source Breakdown Voltage	V_{GS}=0V, I_D=250μA	40	44	-	V
IDSS	Zero Gate Voltage Drain Current	V_{DS}=40V, V_{GS}=0V,	-	-	1.0	μA
IGSS	Gate to Body Leakage Current	V_{DS}=0V, V_{GS}= ±20V	-	-	±100	nA
VGS(th)	Gate Threshold Voltage	V_{DS}=V_{GS}, I_D=250μA	2.0	2.8	4.0	V
RDS(on)	Static Drain-Source on-Resistance note3	V_{GS}=10V, I_D=30A	-	3.0	4.0	mΩ
C_{iss}	Input Capacitance	V_{DS}=20V, V_{GS}=0V, f=1.0MHz	-	4900	-	pF
Coss	Output Capacitance		-	528	-	pF
Crss	Reverse Transfer Capacitance		-	317	-	pF
Q_g	Total Gate Charge	V_{DS}=20V, I_D=30A, V_{GS}=10V	-	80	-	nC
Q_{gs}	Gate-Source Charge		-	17	-	nC
Q_{gd}	Gate-Drain(“Miller”) Charge		-	21	-	nC
td(on)	Turn-on Delay Time	V_{DD}=20V, I_D=30A, R_L=1Ω, R_{GEN}=3Ω, V_{GS}=10V	-	21	-	ns
t_r	Turn-on Rise Time		-	32	-	ns
td(off)	Turn-off Delay Time		-	71	-	ns
t_f	Turn-off Fall Time		-	40	-	ns
IS	Maximum Continuous Drain to Source Diode Forward Current		-	-	150	A
ISM	Maximum Pulsed Drain to Source Diode Forward Current		-	-	600	A
VSD	Drain to Source Diode Forward Voltage	V_{GS}=0V, I_S=30A	-	-	1.2	V
t_{rr}	Body Diode Reverse Recovery Time	T_J=25℃, I_F=20A,dI/dt=100A/μs	-	27	-	ns
Q_{rr}	Body Diode Reverse Recovery Charge		-	46	-	nC

Note :

1、Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
2、The EAS data shows Max. rating . The test condition is T_J=25℃,V_{DD}=20V,V_G=10V,L=0.5mH,Rg=25Ω,I_{AS}=33A
3、The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦ 2%
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.
6、Package limitation current is 180A

Typical Characteristics

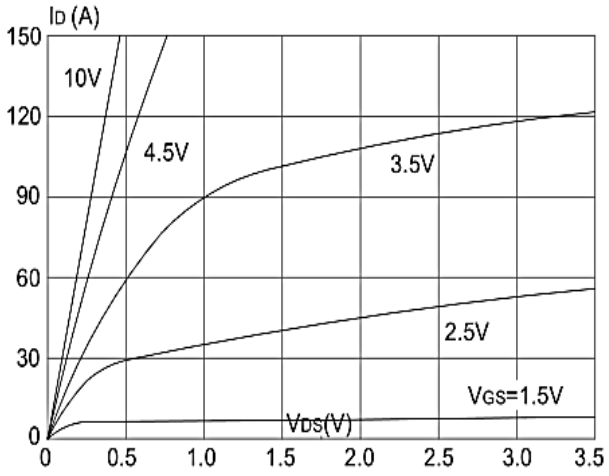

Figure1: Output Characteristics

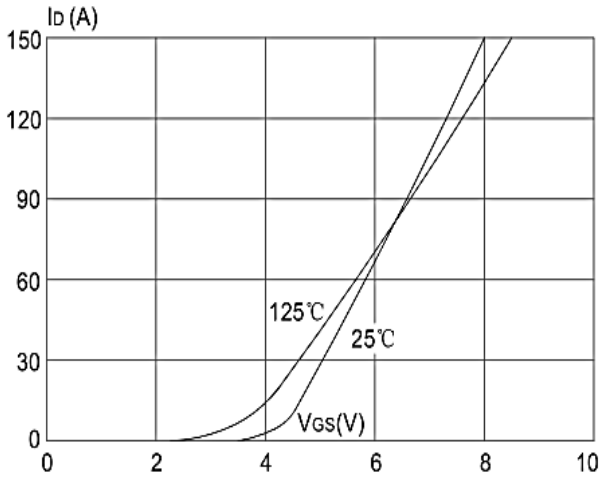

Figure 2: Typical Transfer Characteristics

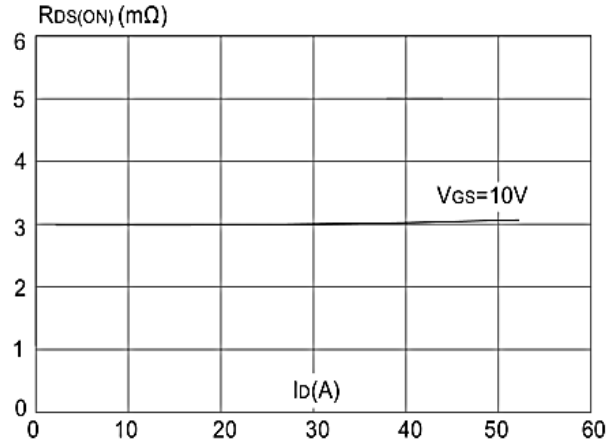

Figure 3:On-resistance vs. Drain Current

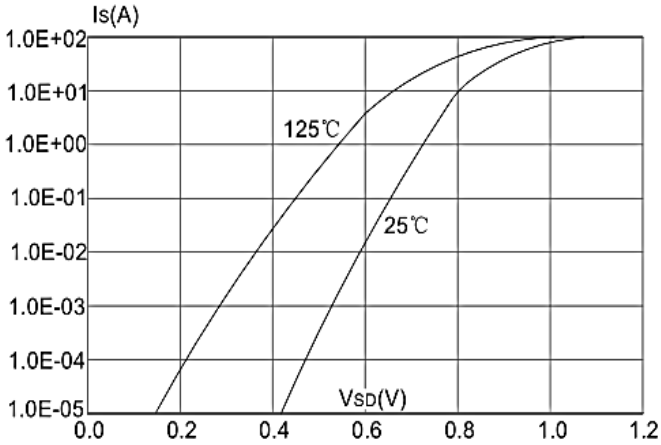

Figure 4: Body Diode Characteristics

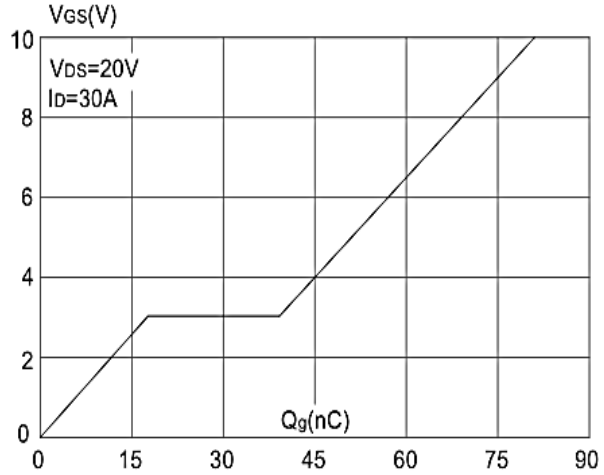

Figure 5: Gate Charge Characteristics

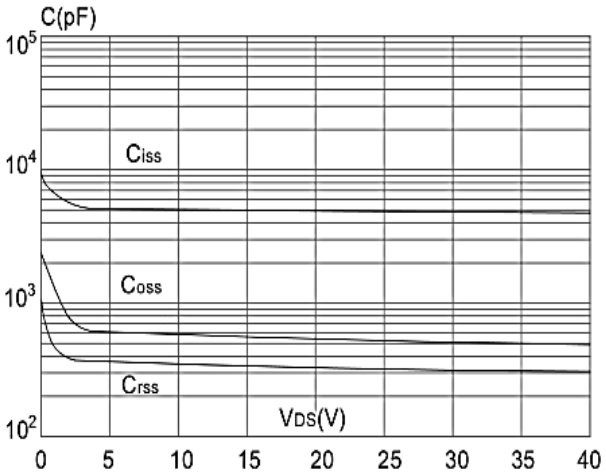

Figure 6: Capacitance Characteristics

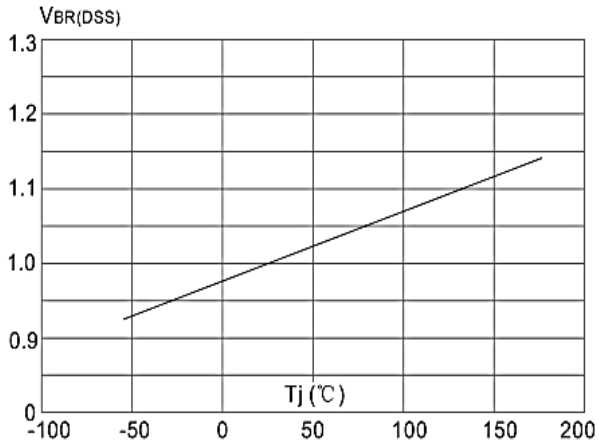

Figure 7: Normalized Breakdown Voltage vs Junction Temperature

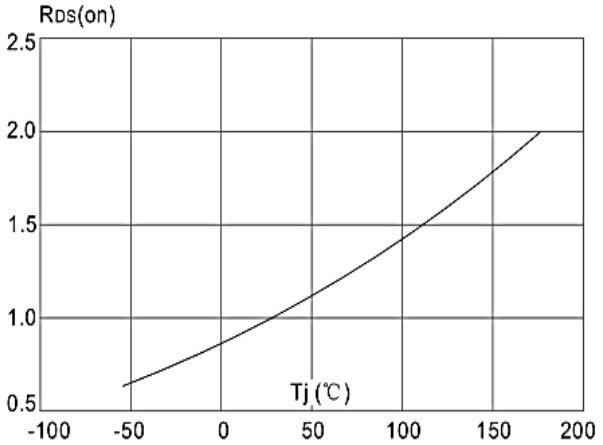

Figure 8: Normalized on Resistance vs. Junction Temperature

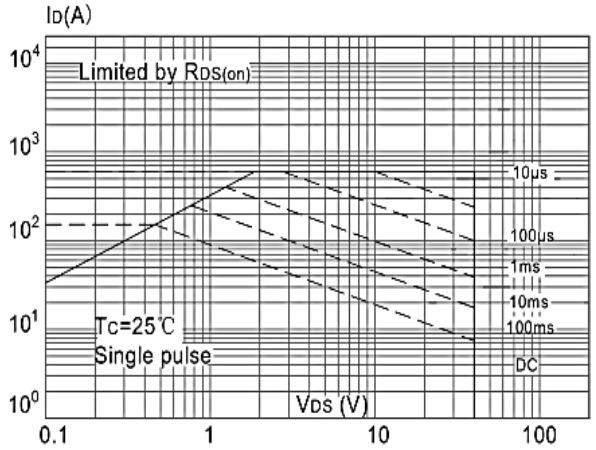

Figure 9: Maximum Safe Operating Area

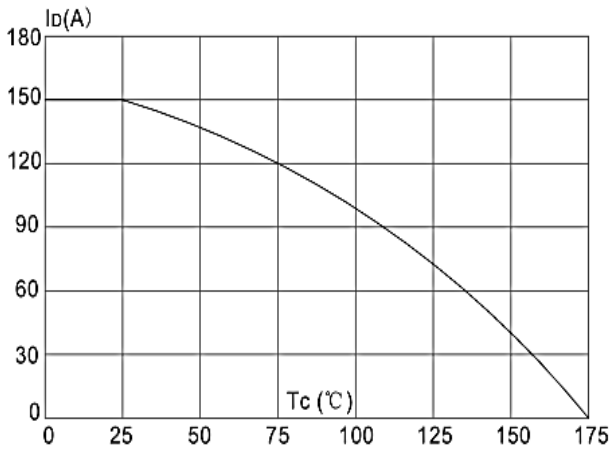

Figure 10: Maximum Continuous Drain Current vs. Ambient Temperature

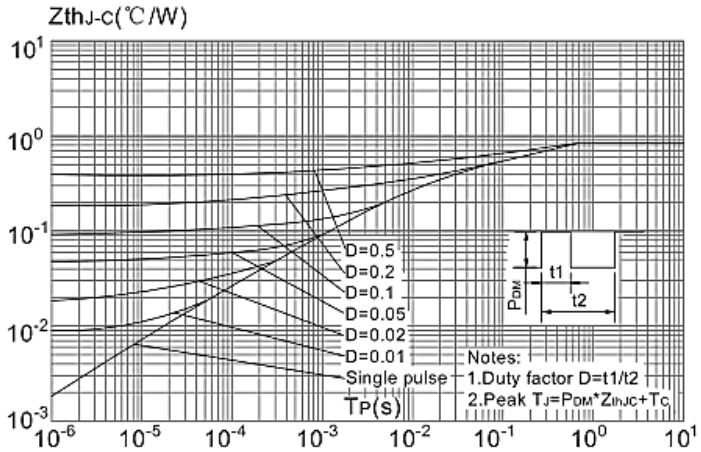

Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Ambien

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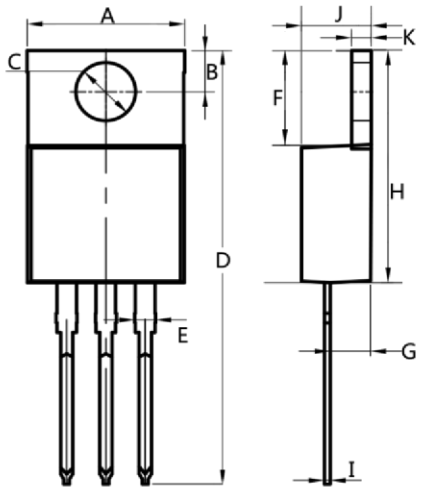
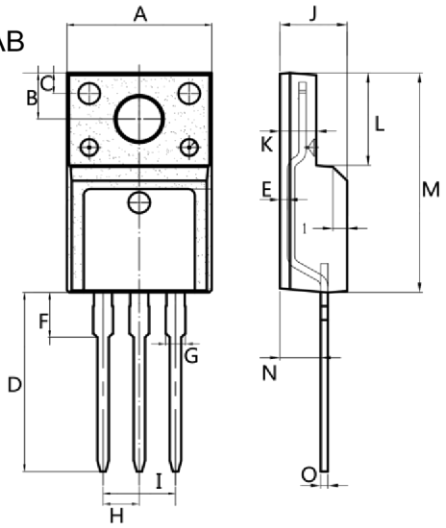
TO-220AB



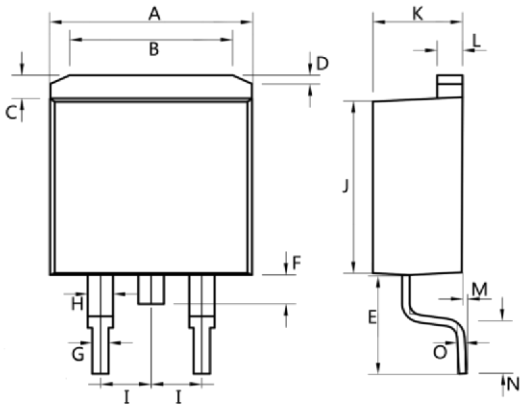
Dim.	Min.	Max.
A	10.0	10.4
B	2.5	3.0
C	3.5	4.0
D	28.0	30.0
E	1.1	1.5
F	6.2	6.6
G	2.9	3.3
H	15.0	16.0
I	0.35	0.45
J	4.3	4.7
K	1.2	1.4
All Dimensions in millimeter		

ITO-220AB



Dim.	Min.	Max.
A	9.9	10.3
B	2.9	3.5
C	1.15	1.45
D	12.75	13.25
E	0.55	0.75
F	3.1	3.5
G	1.25	1.45
H	Typ 2.54	
I	Typ 5.08	
J	4.55	4.75
K	2.4	2. 7
L	6.35	6.75
M	15.0	16.0
N	2.75	3.15
O	0.45	0.60
All Dimensions in millimeter		

TO-263



Dim.	Min.	Max.
A	10.0	10. 5
B	7.25	7.75
C	1.3	1.5
D	0.55	0.75
E	5.0	6.0
F	1.4	1.6
G	0.75	0.95
H	1.15	1.35
I	Typ 2.54	
J	8.4	8.6
K	4.4	4.6
L	1.25	1.45
M	0.02	0.1
N	2.4	2.8
O	0.35	0.45
All Dimensions in millimeter		

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Edition	Date	Change
Rve1.0	2020/4/1	Initial release