

40V N-Channel Enhancement Mode MOSFET

Description

The AP120N04T 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

$V_{DS} = 40V$ $I_D = 120A$

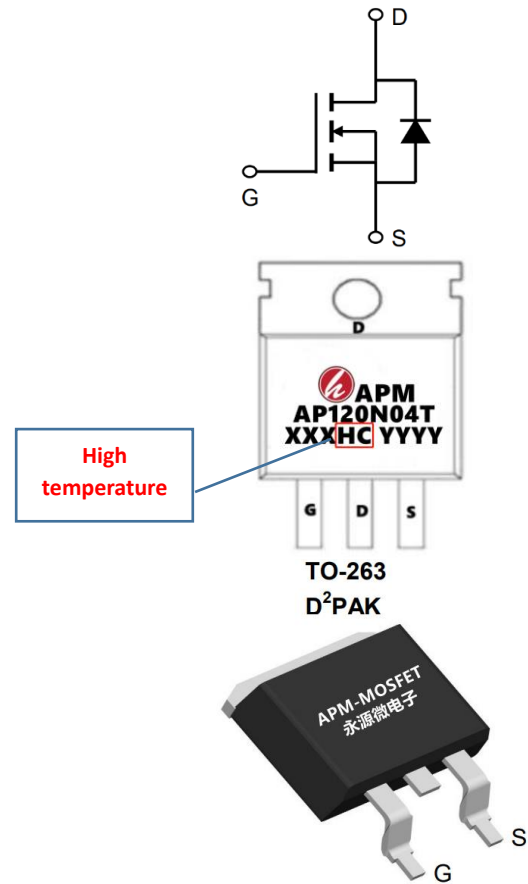
$R_{DS(ON)} < 4.0m\Omega$ @ $V_{GS} = 10V$ (Type: **2.9mΩ**)

TSTG/ T_J: -55 to 175 °C

Application

Load switch

Uninterruptible power supply



Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
AP120N04T	TO-263-3L	AP120N04T XXXHC YYYYY	800

Absolute Maximum Ratings (T_C=25°C 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°C	Continuous Drain Current, V _{GS} @ 10V	120	A
I _D @T _C =75°C	Continuous Drain Current, V _{GS} @ 10V	105	A
I _D @T _C =100°C	Continuous Drain Current, V _{GS} @ 10V	84	A
IDM	Pulsed Drain Current	600	A
EAS	Single Pulse Avalanche Energy	272	mJ
IAS	Avalanche Current	40	A
P _D @T _C =25°C	Total Power Dissipation	180	W
TSTG	Storage Temperature Range	-55 to 175	°C
T _J	Operating Junction Temperature Range	-55 to 175	°C
R _{θJA}	Thermal Resistance Junction-Ambient	50	°C/W
R _{θJC}	Thermal Resistance Junction-Case ¹	0.78	°C/W

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Electrical Characteristics (T_J=25°C, 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	1.3	2.0	3.0	V
RDS(on)	Static Drain-Source on-Resistance	V _{GS} =10V, I _D =40A TC=25°C	-	2.9	4.0	mΩ
RDS(on)	Static Drain-Source on-Resistance	V _{GS} =10V, I _D =40A TC=75°C	-	3.2	4.5	mΩ
RDS(on)	Static Drain-Source on-Resistance	V _{GS} =10V, I _D =40A TC=150°C	-	4.9	6.0	mΩ
RDS(on)	Static Drain-Source on-Resistance	V _{GS} =10V, I _D =40A TC=170°C	-	5.8	7.5	mΩ
C _{iss}	Input Capacitance	V _{DS} =20V, V _{GS} =0V, f=1.0MHz	-	5734	-	pF
C _{oss}	Output Capacitance		-	686	-	pF
C _{rss}	Reverse Transfer Capacitance		-	338	-	pF
Q _g	Total Gate Charge	V _{DS} =20V, I _D =40A, V _{GS} =10V f=1MHz	-	126	-	nC
Q _{gs}	Gate-Source Charge		-	24	-	nC
Q _{gd}	Gate-Drain("Miller") Charge		-	31	-	nC
td(on)	Turn-on Delay Time	V _{GS} =10V, V _{DD} =20V, R _{G_ext} =2.7Ω	-	20	-	ns
t _r	Turn-on Rise Time		-	106	-	ns
td(off)	Turn-off Delay Time		-	68	-	ns
t _f	Turn-off Fall Time		-	112	-	ns
IS	Maximum Continuous Drain to Source Diode Forward Current		-	-	120	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	-	0.9	1.2	V
t _{rr}	Body Diode Reverse Recovery Time	T _J =25°C, I _F =20A, dI/dt=100A/μs	-	29	-	ns
Q _{rr}	Body Diode Reverse Recovery Charge		-	28	-	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°C, V_{DD}=48V, V_G=10V, L=0.5mH, R_G=25Ω, I_{AS}=40A
- 3、The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦ 2%
- 4、The power dissipation is limited by 150°C 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

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Typical Characteristics

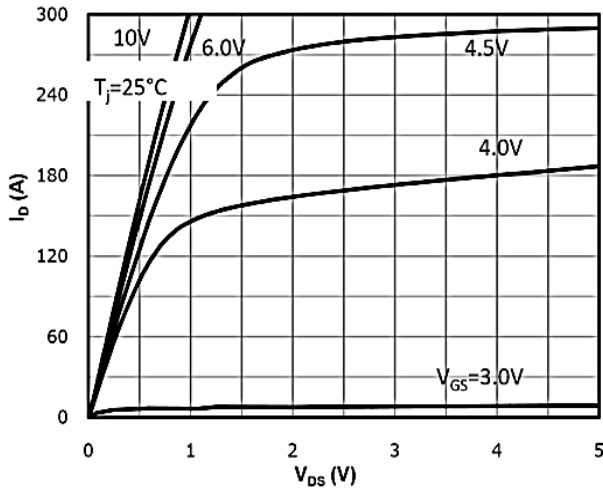


Fig1: Output Characteristics

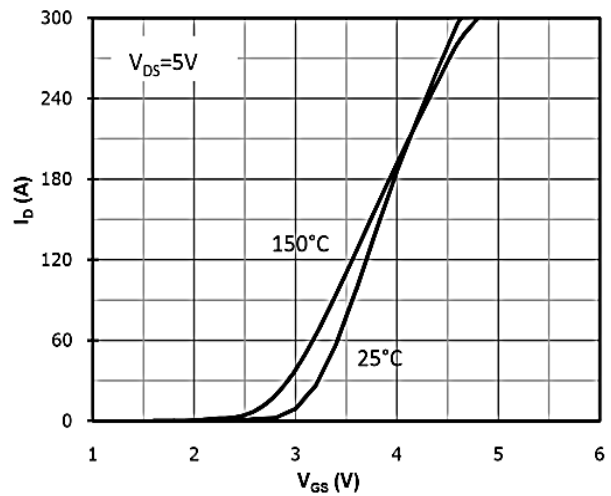


Fig2: Transfer Characteristics

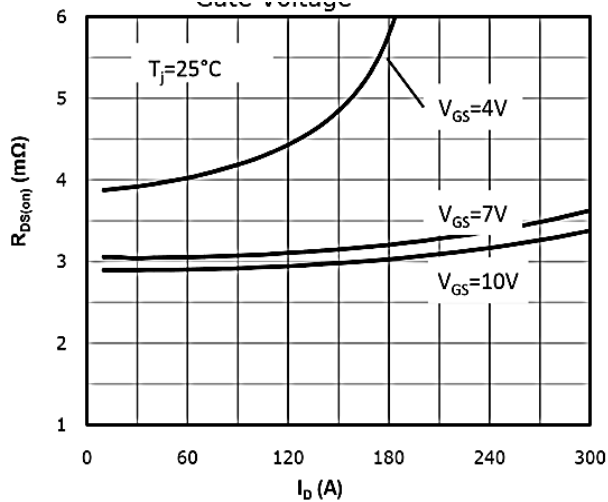


Fig3: Output Characteristics

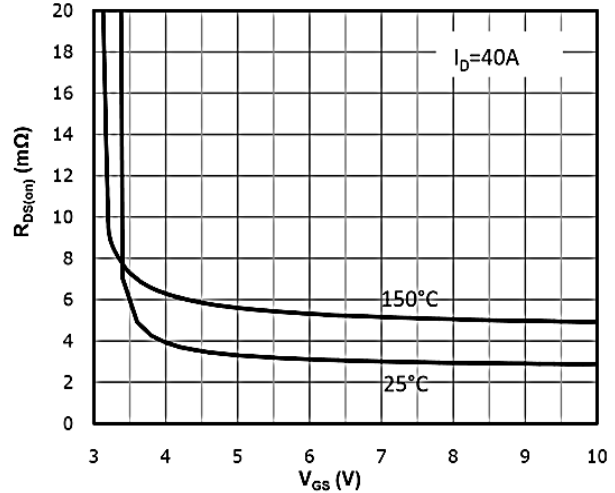


Fig4: RDS(on) Vs Gate Voltage

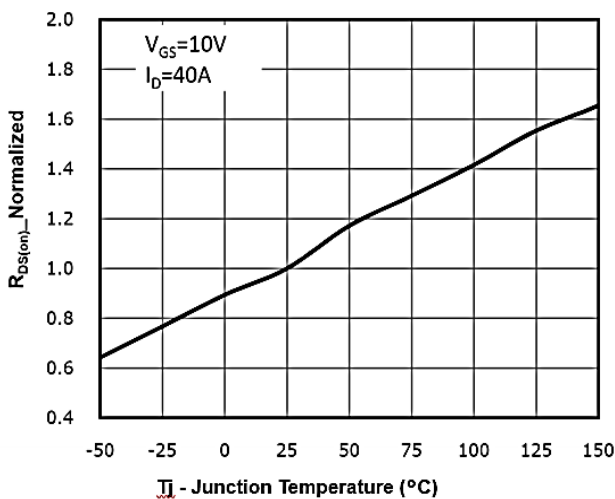


Fig5: RDS(on) VS. Temperature

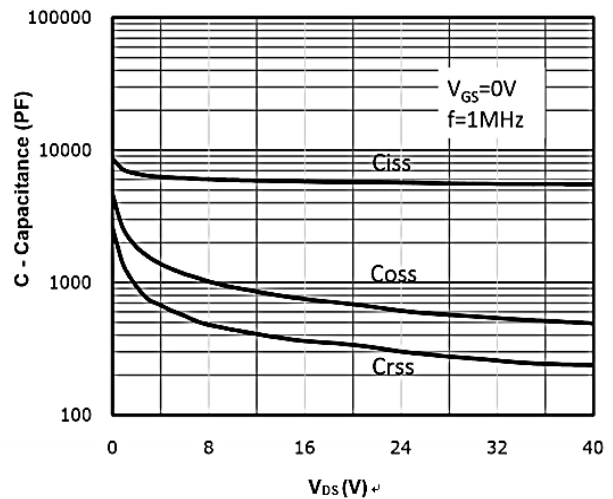


Fig6: Capacitance Characteristics

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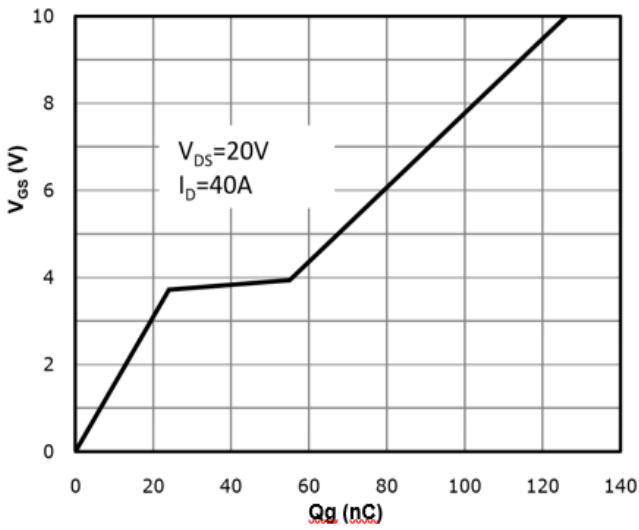


Fig7: Gate Charge Characteristics

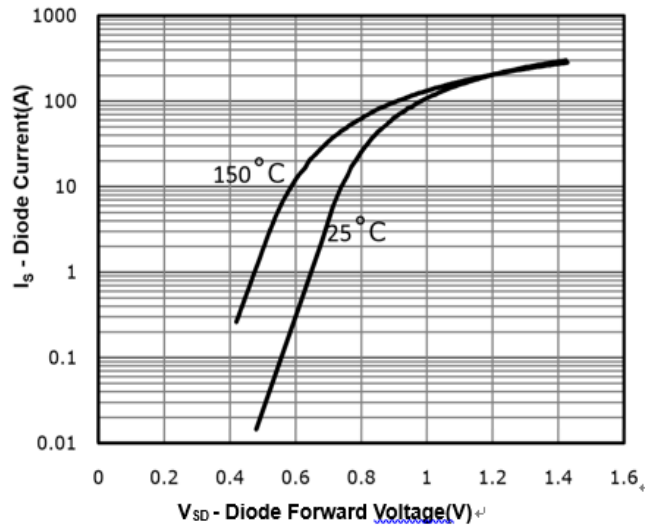


Fig8: Body-diode Forward Characteristics

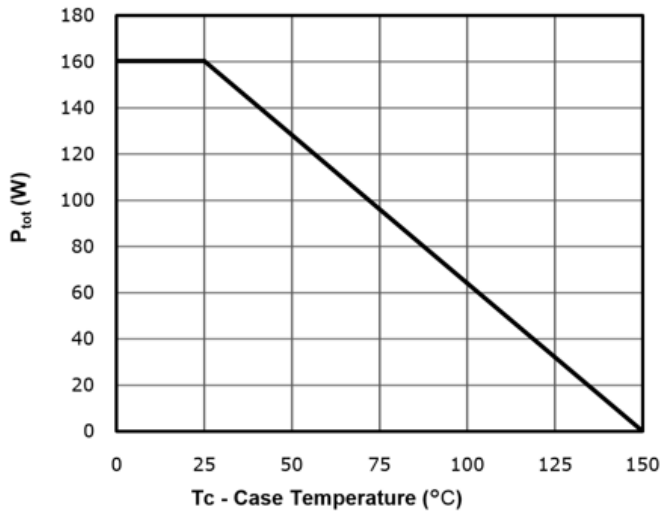


Fig9: Power Dissipation

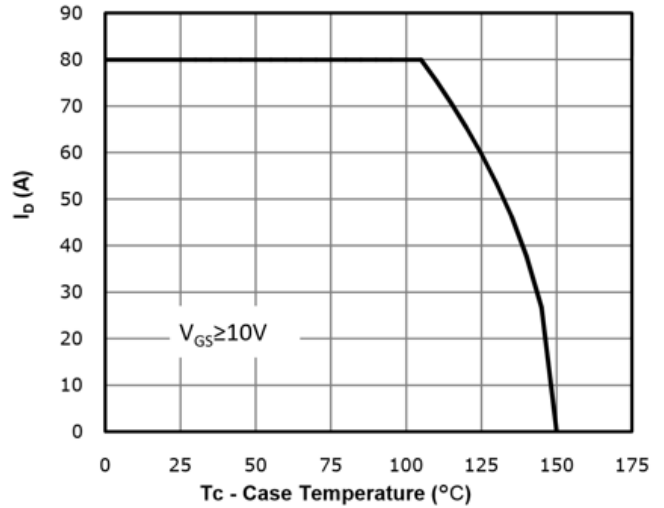


Fig10: Drain Current Derating

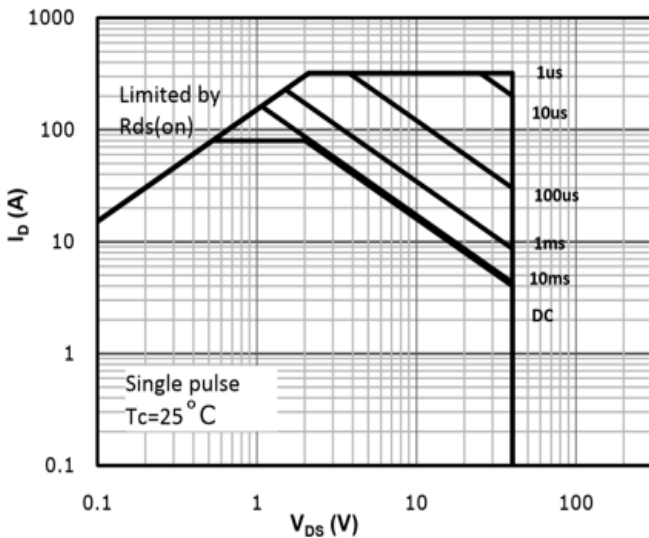


Fig11: Safe Operating Area

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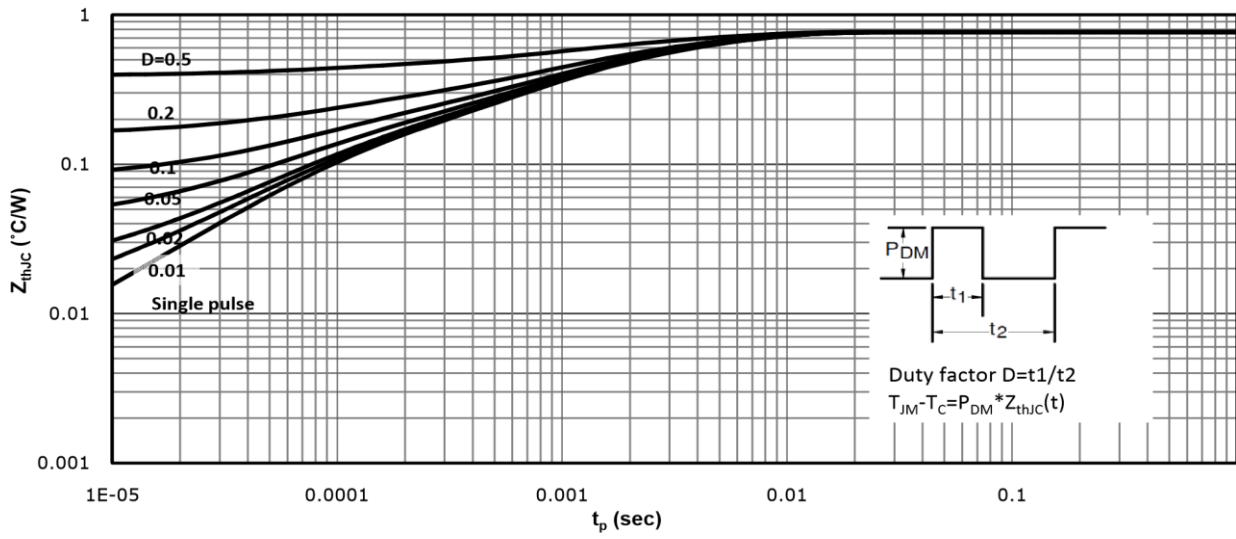
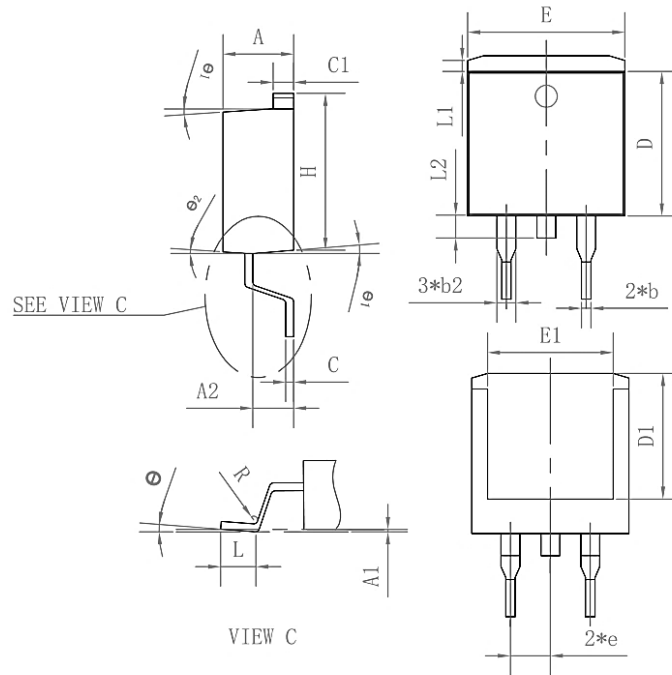


Fig12: Max. Transient Thermal Impedance

Package Mechanical Data-TO-263-3L-SLK



Symbol	Common		
	mm		
	Mim	Nom	Max
A	4.35	4.47	4.60
A1	0.09	0.10	0.11
A2	2.30	2.40	2.70
b	0.70	0.80	1.00
b2	1.25	1.36	1.50
C	0.45	0.50	0.65
C1	1.29	1.30	9.40
D	9.10	9.20	9.30
D1	7.90	8.00	8.10
E	9.85	10.00	10.20
E1	7.90	8.00	8.10
H	15.30	15.50	15.70
e	-	2.54	-
L	2.34	2.54	2.74
L1	1.00	1.10	1.20
L2	1.30	1.40	1.50
R	0.24	0.25	0.26
θ	0°	4°	8°
θ1	4°	7°	10°
θ2	0°	3°	6°

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Edition	Date	Change
Rve1.0	2021/12/1	Initial release

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