AP80P04P/T

-40V P-Channel Enhancement Mode MOSFET

Description

The AP80P04P/T 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 =-80 A

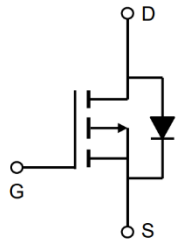
$R_{DS(ON)}$ < 8.5mΩ @ V_{GS}=-10V **(Type：6.5mΩ)**

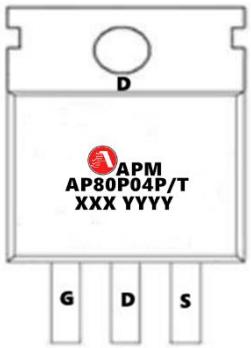
Application

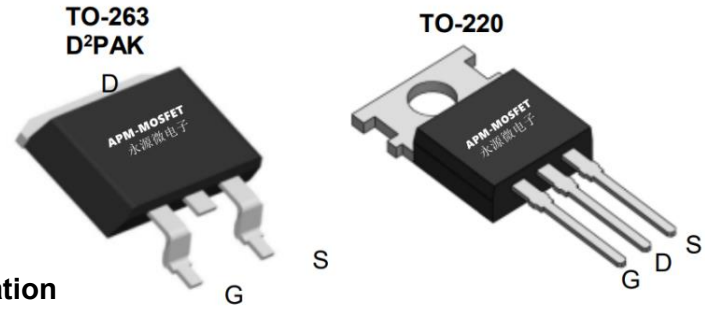
Battery protection

Load switch

Uninterruptible power supply







Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
AP80P04P	TO-220-3L	AP80P04P XXX YYYY	1000
AP80P04T	TO-263-3L	AP80P04T XXX YYYY	800

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

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]	-80	A
I_D@T_C=100℃	Continuous Drain Current, V_{GS} @ -10V[1]	-50.6	A
IDM	Pulsed Drain Current[2]	-320	A
EAS	Single Pulse Avalanche Energy[3]	101.2	mJ
IAS	Avalanche Current	-45	A
P_D@T_C=25℃	Total Power Dissipation[4]	102	W
TSTG	Storage Temperature Range	-55 to 150	℃
T_J	Operating Junction Temperature Range	-55 to 150	℃
RθJA	Thermal Resistance Junction-Ambient [1]	62	℃/W
RθJC	Thermal Resistance Junction-Case[1]	1.35	℃/W

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

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V(BR)DSS	Drain-Source Breakdown Voltage	V_{GS}=0V, I_D=-250μA	-40	-	-	V
IGSS	Gate-body Leakage current	V_{DS}=0V, V_{GS}=±20V	-	-	±100	nA
IDSS T_J=25°C	Zero Gate Voltage Drain Current	V_{DS}=-40V, V_{GS}=0V	-	-	-1	μA
IDSS T_J=100°C					-100	
VGS(th)	Gate-Threshold Voltage	V_{DS}=V_{GS}, I_D=-250μA	-1.0	-1.6	-2.5	V
RDS(on)	Drain-Source on-Resistance[4]	V_{GS}=-10V, I_D=-20A	-	6.5	8.5	mΩ
		V_{GS}=-4.5V, I_D=-15A	-	8.2	11	
gfs	Forward Transconductance[4]	V_{DS}=-10V, I_D=-20A	-	104	-	S
Ciss	Input Capacitance	V_{DS}=-20V, V_{GS}=0V, f=1MHz	-	5282	-	pF
Coss	Output Capacitance		-	431	-	
Crss	Reverse Transfer Capacitance		-	383	-	
R_g	Gate Resistance	f=1MHz	-	4.4	-	Ω
Q_g	Total Gate Charge	V_{GS}=-10V, V_{DS}=-20V, I_D=-20A	-	110	-	nC
Qgs	Gate-Source Charge		-	12.5	-	
Qgd	Gate-Drain Charge		-	23	-	
td(on)	Turn-on Delay Time	V_{GS}=-10V, V_{DD} -20V, R_G=3Ω, I_D=-20A	-	16.8	-	ns
t_r	Rise Time		-	10	-	
td(off)	Turn-off Delay Time		-	65	-	
t_f	Fall Time		-	17	-	
trr	Body Diode Reverse Recovery Time	I_F=-20A, dI/dt=100A/μs	-	42	-	ns
Q_{rr}	Body Diode Reverse Recovery Charge		-	29	-	nC
VSD	Diode Forward Voltage[4]	I_S=-20A, V_{GS}=0V -	-	-	-1.2	V
IS	Continuous Source 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 ≦ 300us , duty cycle ≦ 2%

3、The EAS data shows Max. rating . The test condition is VDD=-32V,VGS=-10V,L=0.1mH,IAS=-45A

4、The power dissipation is limited by 150℃ 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

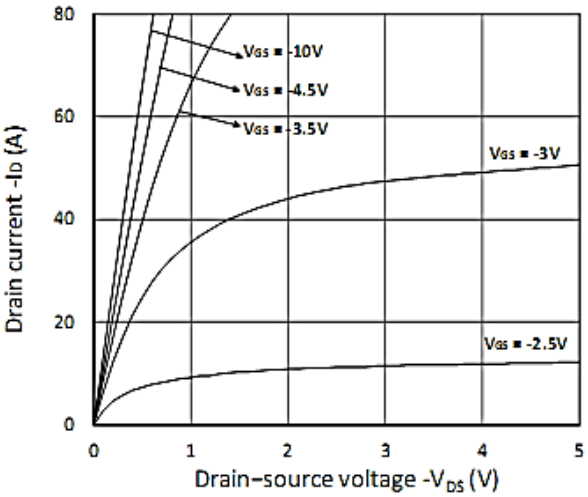


Figure 1. Output Characteristics

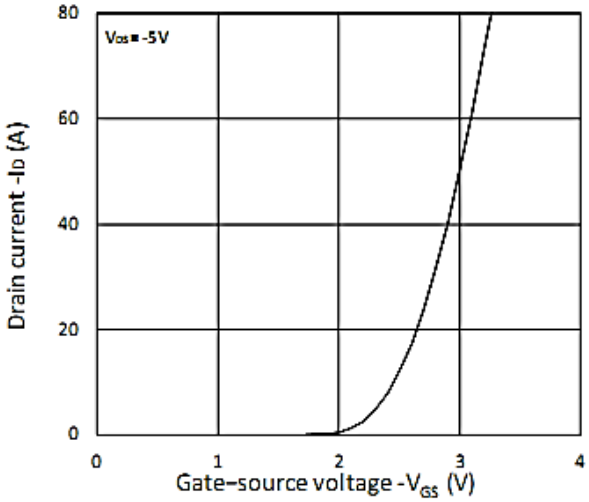


Figure 2. Transfer Characteristics

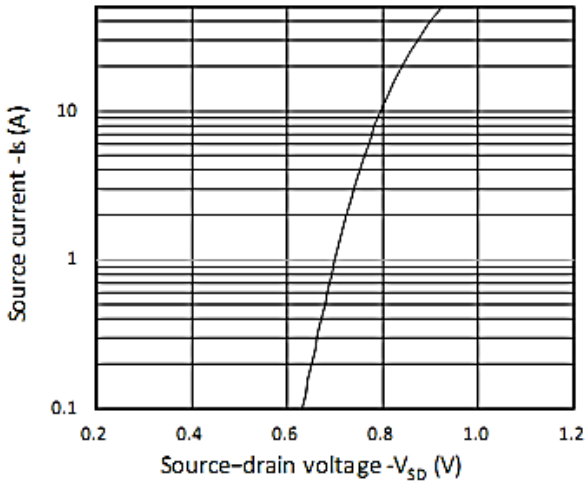


Figure 3. Forward Characteristics of Reverse

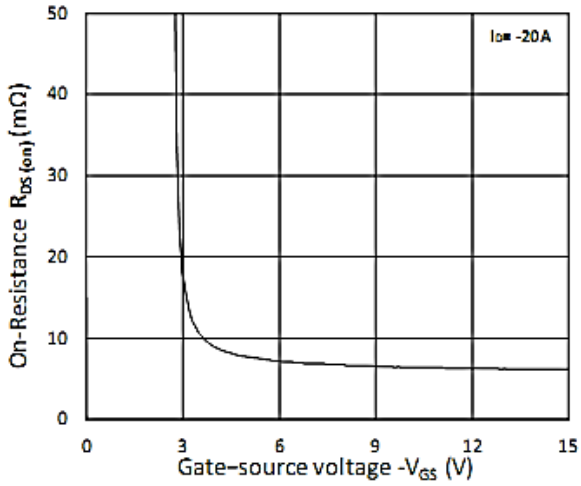


Figure 4. R DS(ON) vs. VGS

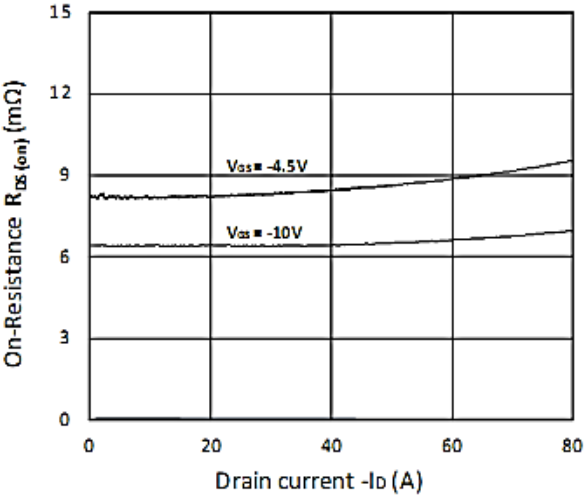


Figure 5. RDS(ON) vs. ID

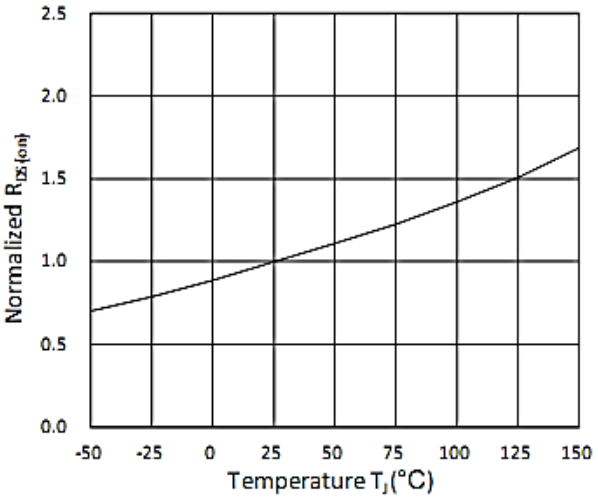


Figure 6. Normalized RDS(on) vs. Temperature

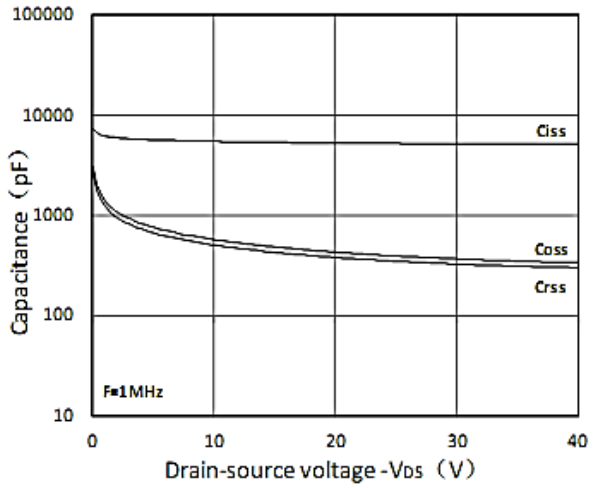


Figure 7. Capacitance Characteristics

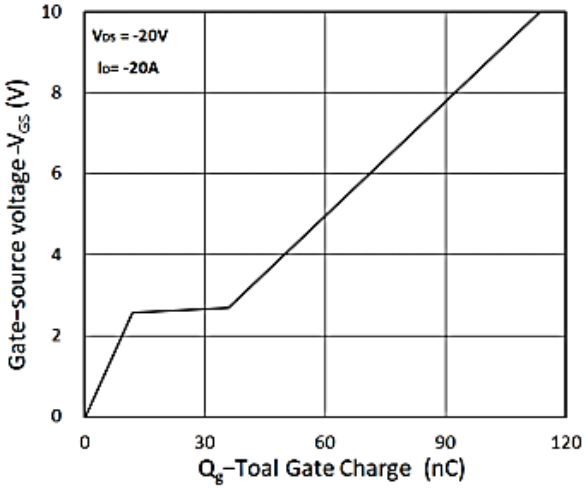


Figure 8. Gate Charge Characteristics

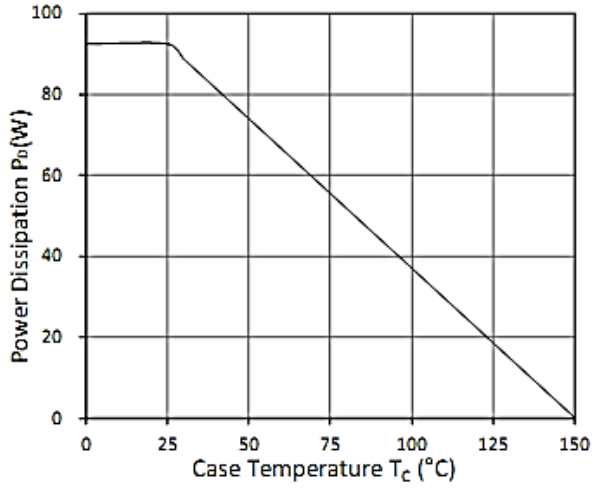


Figure 9. Power Dissipation

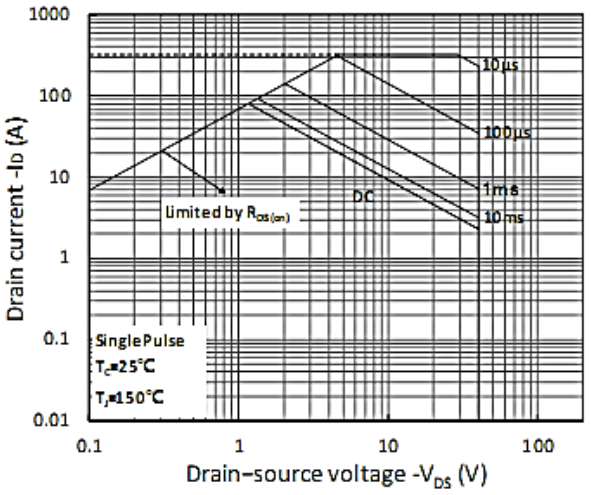


Figure10. Safe Operating Area

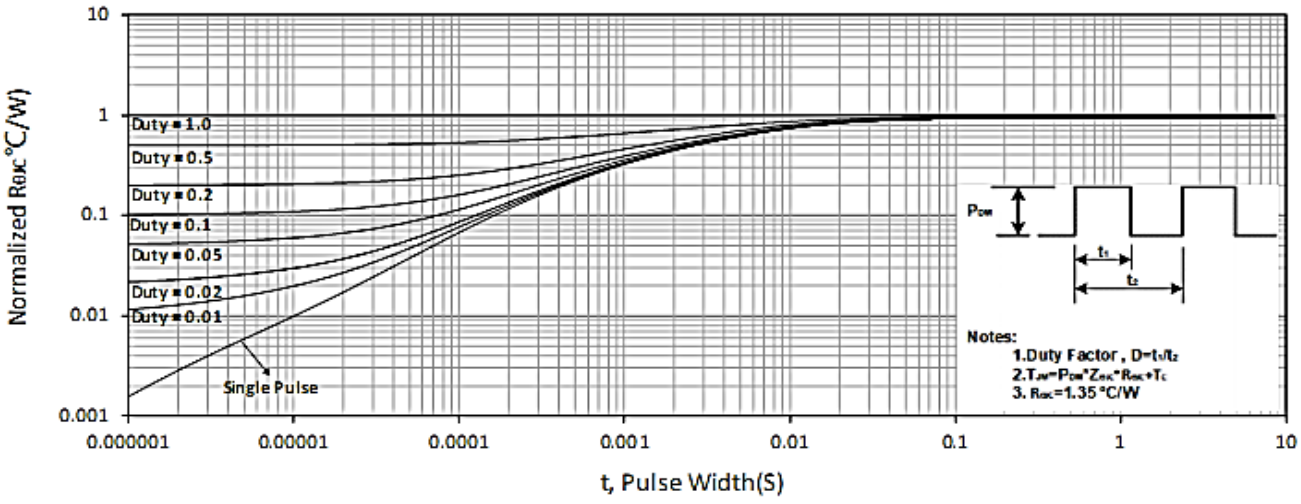
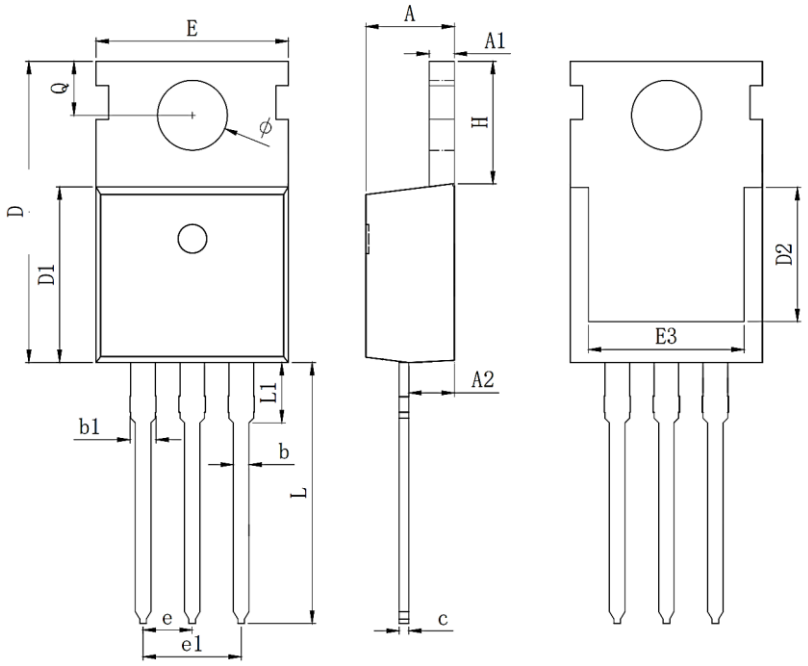


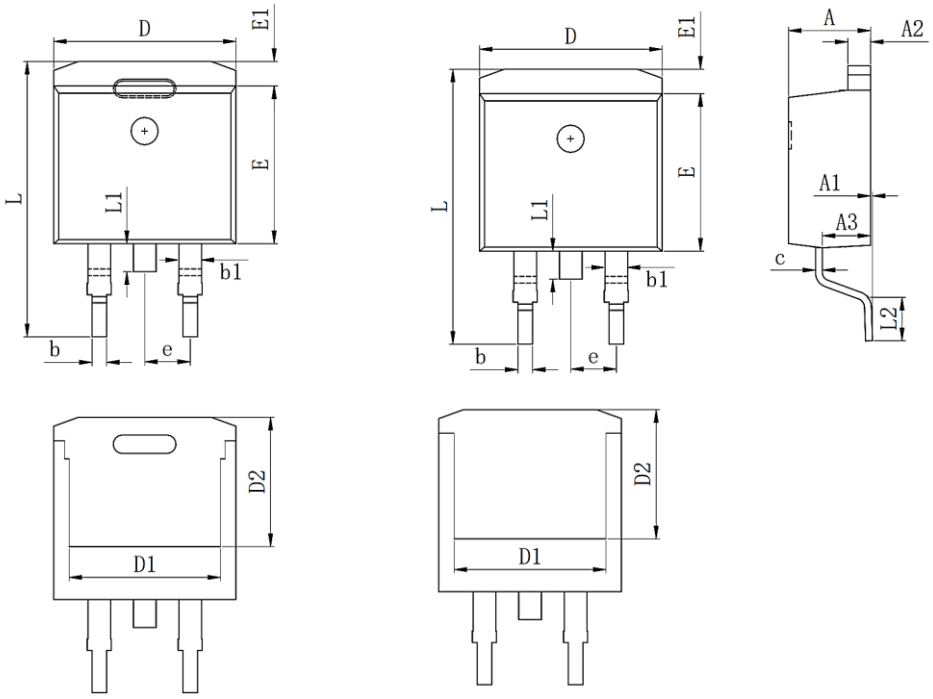
Figure 9 Normalized Maximum Transient Thermal Impedance

Package Mechanical Data:TO-220C-3L



Symbol	Dim in mm		
	Min	Typ	Max
A	4.25	4.5	4.7
A1	1.15	1.3	1.45
A2	2.15	2.35	2.55
b	0.65	0.8	0.95
b1	1.15	1.35	1.55
c	0.35	0.5	0.65
D	14.3	15.3	16.3
D1	8.8	9.1	9.4
D2		6.3REF	
E	9.7	10	10.3
E3	7	8	9
e		2.54BSC	
e1		5.08BSC	
L	12.7	13.5	13.9
L1		3.1	3.4
H	6	6.5	6.85
Q	2.6	2.8	3
ϕ	3.4	3.6	3.8

Package Mechanical Data:TO-263C-3L



Symbol	Dim in mm		
	Min	Typ	Max
A	4.37	4.57	4.77
A1	0		0.25
A2	1.22	1.27	1.42
A3	2.49	2.69	2.89
b	0.7	0.81	0.96
b1	1.17	1.27	1.47
c	0.3	0.38	0.53
D	9.86	10.16	10.36
D1	8.4REF		
D2	7.073REF		
E	8.5	8.7	8.9
E1	1.07	1.27	1.47
e	2.54BSC		
L	17.7	15.1	15.5
L1	1.4	1.55	1.7
L2	2	2.3	2.6
H	6	6.5	6.85
Q	2.6	2.8	3
ϕ	3.4	3.6	3.8

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-40V P-Channel Enhancement Mode MOSFET

Edition	Date	Change
REV1.0	2020/10/8	Initial release