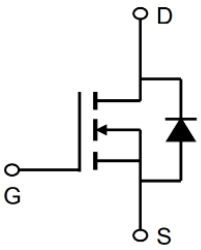
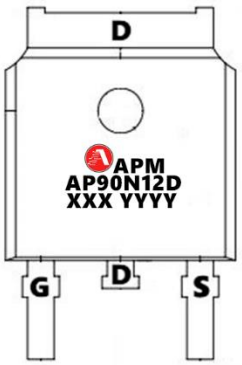
AP90N12D

120V N-Channel Enhancement Mode MOSFET

Description

The AP90N12D uses advanced **SGT II** technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 7.5V. This device is suitable for use as a Battery protection or in other Switching application.





General Features

V_{DS} = 120V I_D =90A

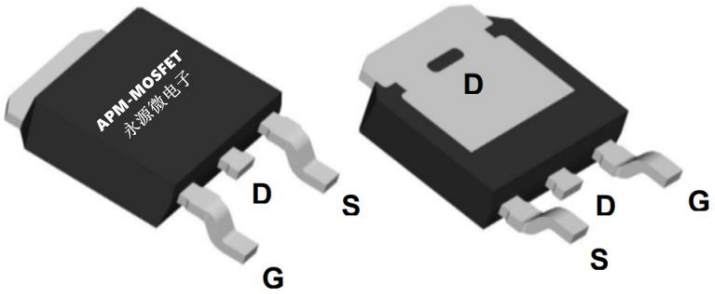
$R_{DS(ON)}$ < 9.0mΩ @ V_{GS}=10V （**Type：7.5mΩ**）

Application

Mobile phone fast charging

Brushless motor

Home appliance control board



Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
AP90N12D	TO-252-3L	AP90N12D XXXX YYYY	2500

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

Symbol	Parameter	Value	Unit
VDS	Drain source voltage	120	V
VGS	Gate source voltage	±20	V
I_D@T_A=25℃	Continuous drain current[1], T_C=25 ℃	90	A
I_D@T_A=70℃	Continuous drain current[1], T_C=75 ℃	35	A
IDM	Pulsed drain current[2], T_C=25 ℃	270	A
P_D	Power dissipation[3], T_C=25 ℃	160	W
EAS	Single pulsed avalanche energy[4]	125	mJ
Tstg，Tj	Operation and storage temperature	-55 to 150	℃
RθJC	Thermal resistance, junction-case	0.89	℃/W
RθJA	Thermal resistance, junction-ambient[5]	62.5	℃/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	120	135	-	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} = 120V, V_{GS} = 0V	-	-	1	μA
IDSS T_J=100°C			-	-	100	
VGS(th)	Gate-Threshold Voltage	V_{DS} = V_{GS}, I_D = 250μA	1.5	2.0	2.5	V
RDS(on)	Drain-Source on-Resistance[4]	V_{GS} = 10V, I_D = 20A	-	7.5	9.0	mΩ
		V_{GS} = 4.5V, I_D = 10A	-	9.0	12	
gfs	Forward Transconductance[4]	V_{DS}=10V, I_D=20A	-	75	-	S
Ciss	Input Capacitance	V_{DS} = 60V, V_{GS} = 0V, f =1MHz	-	1854	-	pF
Coss	Output Capacitance		-	270	-	
Crss	Reverse Transfer Capacitance		-	10	-	
R_g	Gate Resistance	f =1MHz	-	2.3	-	Ω
Q_g	Total Gate Charge	V_{GS} = 10V, V_{DS} = 60V, I_D= 20A	-	30	-	nC
Qgs	Gate-Source Charge		-	5.8	-	
Qgd	Gate-Drain Charge		-	6	-	
td(on)	Turn-on Delay Time	V_{GS} = 10V, V_{DD} = 60V, R_G = 3Ω, I_D= 20A	-	9.5	-	ns
t_r	Rise Time		-	4.2	-	
td(off)	Turn-off Delay Time		-	27.2	-	
t_f	Fall Time		-	6.6	-	
trr	Body Diode Reverse Recovery Time	I_F = 20A, dI/dt =100A/μs	-	52	-	ns
Q_{rr}	Body Diode Reverse Recovery Charge		-	83.5	-	nC
VSD	Diode Forward Voltage[4]	I_S = 20A, V_{GS} = 0V	-	-	1.2	V
IS T_C=25°C	Continuous Source Current	-	-	-	90	A

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 .The EAS data shows Max. rating .

3、The power dissipation is limited by 175℃ junction temperature

4、EAS condition: TJ=25℃, V_{DD}=50V,V_{GS}=10V,L=0.1mH，I_{AS}=30A

5、The data is theoretically the same as ID and IDM , in real applications , should be limited by total power dissipation.

Typical Characteristics

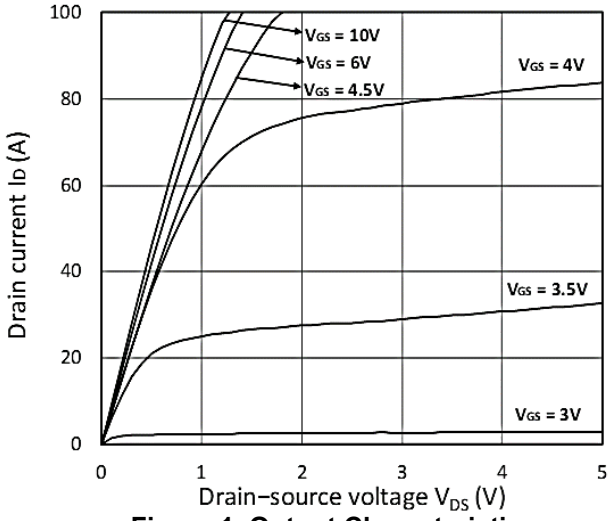


Figure 1. Output Characteristics

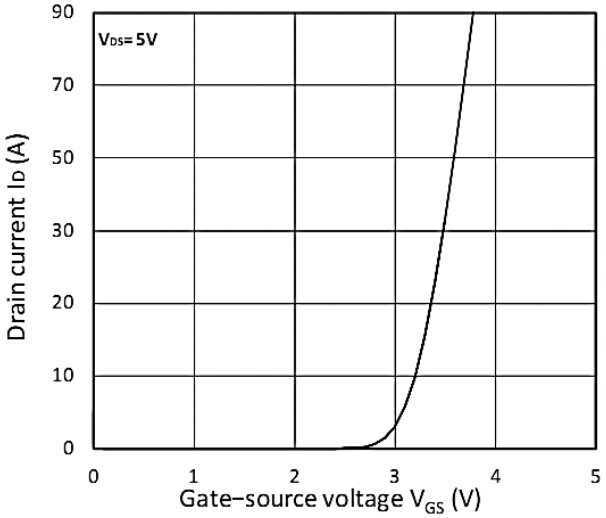


Figure 2. Transfer Characteristics

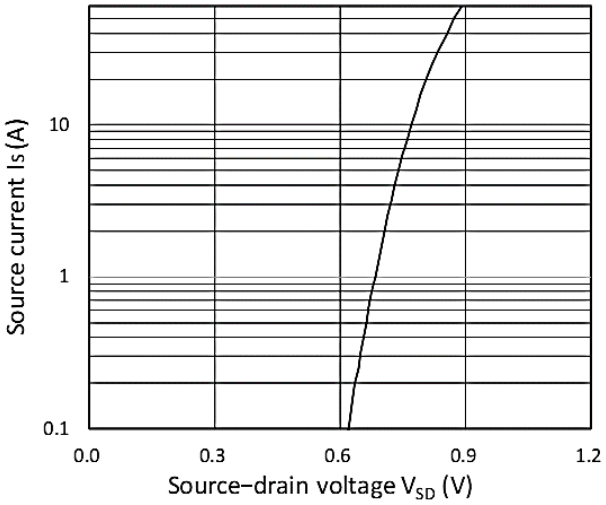


Figure 3. Forward Characteristics of Reverse

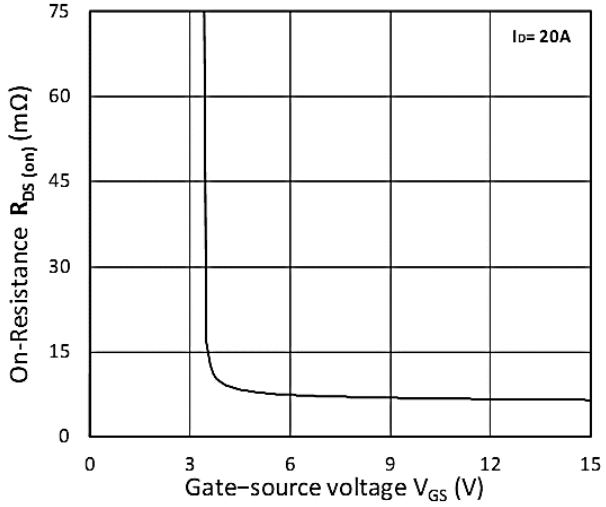


Figure 4. RDS(ON) vs. VGS

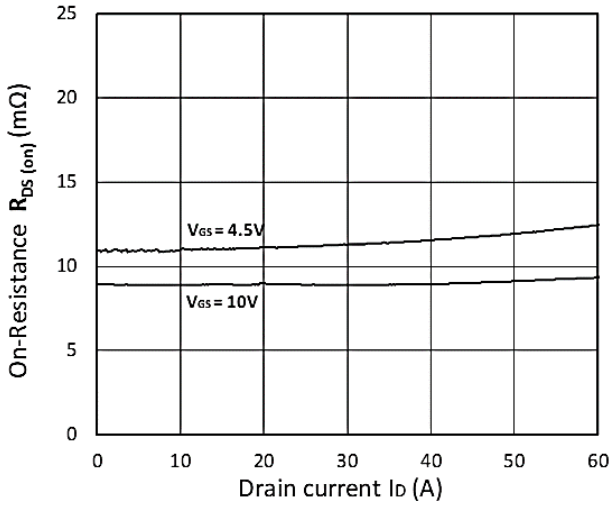


Figure 5. R DS(ON) vs. ID

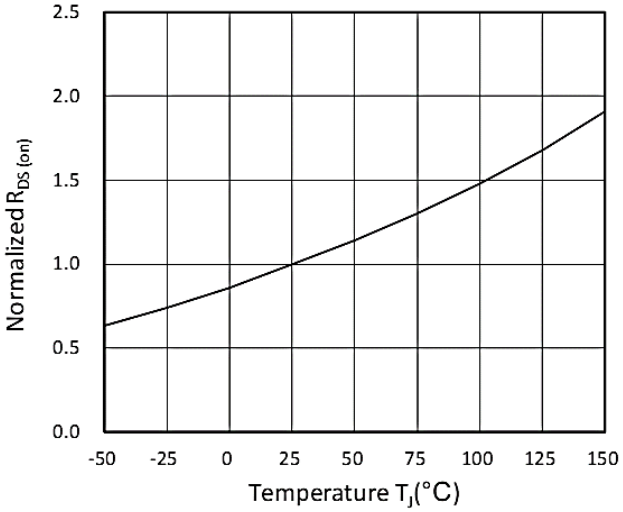


Figure 6. Normalized R DS(on) vs. Temperature

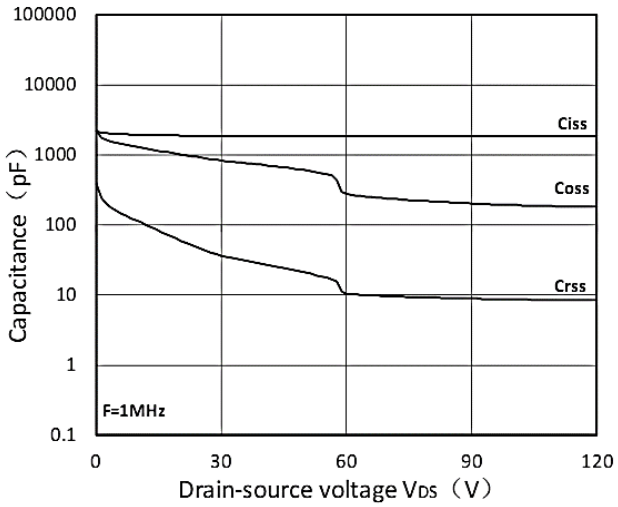


Figure 7. Capacitance Characteristics

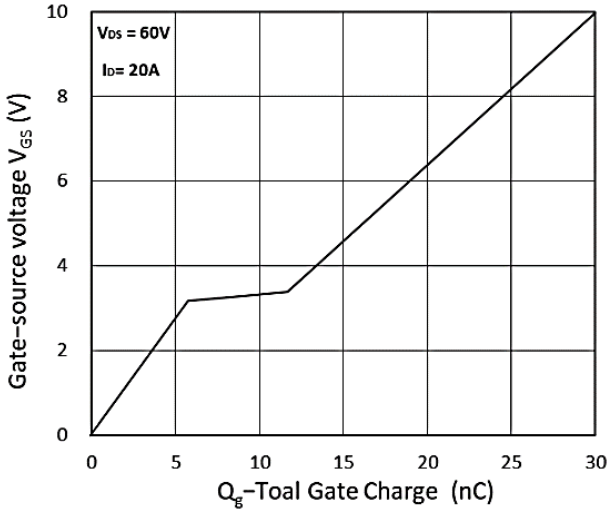


Figure 8. Gate Charge Characteristics

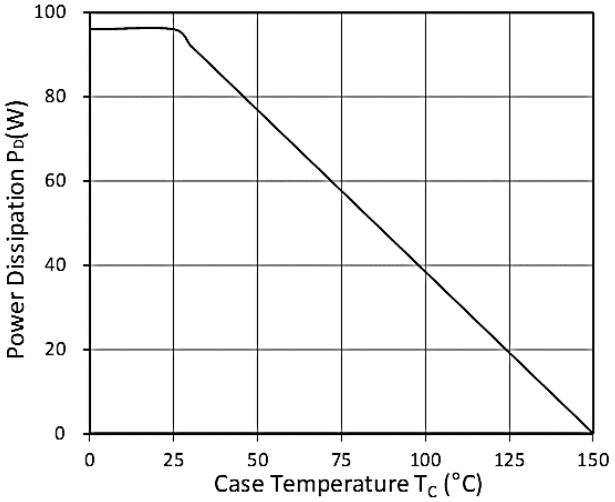


Figure 9. Power Dissipation

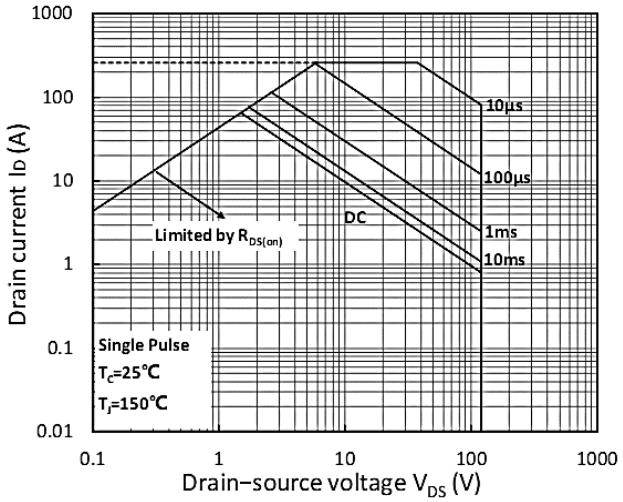


Figure10. Safe Operating Area

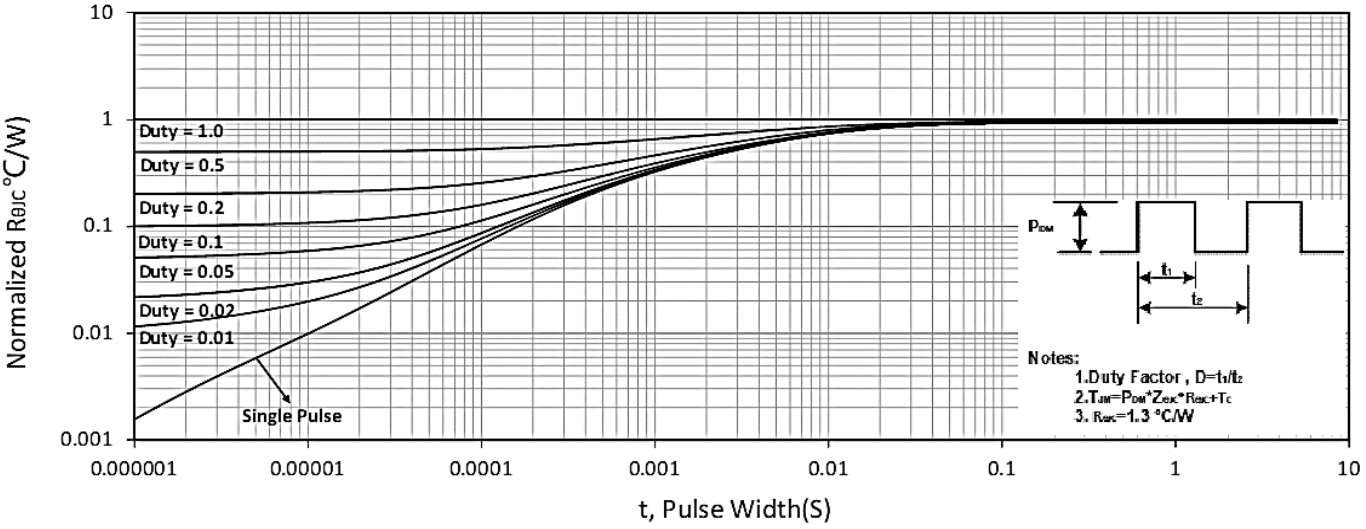
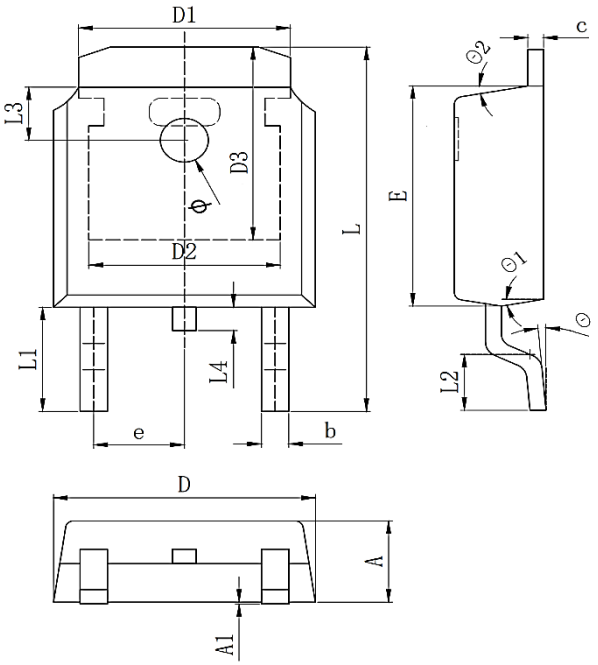


Figure 11. Normalized Maximum Transient Thermal Impedance

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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120V N-Channel Enhancement Mode MOSFET

Edition	Date	Change
REV1.0	2023/8/1	Initial release