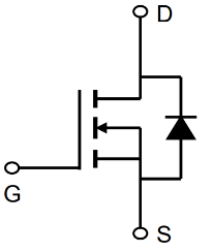
AP50N12D

120V N-Channel Enhancement Mode MOSFET

Description

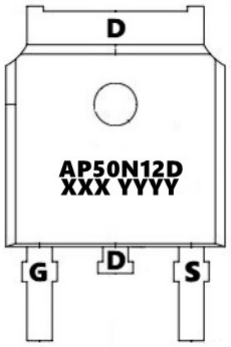
The AP50N12D uses advanced **SGT II** technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 10V. This device is suitable for use as a Battery protection or in other Switching application.



General Features

V_{DS} = 120V I_D =50A

$R_{DS(ON)}$ < 32mΩ @ V_{GS}=10V （**Type：25mΩ**）

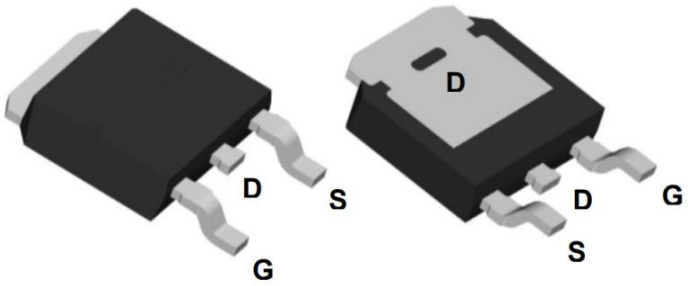


Application

Mobile phone fast charging

Brushless motor

Home appliance control board



Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
AP50N12D	TO-252-3L	AP50N12D XXX YYYY	2500

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

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	120	V
V_{GS}	Gate-Source Voltage	±20	V
I_D@T_C=25℃	Continuous Drain Current[1]	48	A
I_D@T_C=100℃	Continuous Drain Current[1]	34	A
I_{DM}	Pulsed Drain Current[2]	150	A
EAS	Single Pulse Avalanche Energy[3]	6	mJ
I_{AS}	Avalanche Current	5	A
P_D@T_C=25℃	Total Power Dissipation[3]	113	W
T_{STG} T_J	Storage Temperature Range	-55 to 150	℃
$R_{\theta JA}$	Thermal Resistance Junction-ambient [1]	62.5	℃/W
$R_{\theta JC}$	Thermal Resistance Junction-Case[1]	1.1	℃/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	120	135	---	V
RDS(ON)	Static Drain-Source On-Resistance[2]	V_{GS}=10V , I_D=20A	---	25	32	mΩ
VGS(th)	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =250uA	2.0	3.0	4.0	V
IDSS	Drain-Source Leakage Current	V_{DS}=96V , V_{GS}=0V , T_J=25℃	---	---	1	uA
		V_{DS}=96V , 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=20A	---	50	---	S
Q_g	Total Gate Charge	V_{DS}=50V , V_{GS}=10V , I_D=20A	---	20.6	---	nC
Qgs	Gate-Source Charge		---	6.9	---	
Qgd	Gate-Drain Charge		---	5.1	---	
Td(on)	Turn-On Delay Time	V_{DD}=30V , V_{GS}=10V , R_G=3.3 I_D=1A	---	12.7	---	ns
T_r	Rise Time		---	8.2	---	
Td(off)	Turn-Off Delay Time		---	30.3	---	
T_f	Fall Time		---	13.3	---	
Ciss	Input Capacitance	V_{DS}=50V , V_{GS}=0V , f=1MHz	---	1362	---	pF
Coss	Output Capacitance		---	192	---	
Crss	Reverse Transfer Capacitance		---	3.7	---	
IS	Continuous Source Current[1,5]	V_G=V_D=0V , Force Current	---	---	20	A
VSD	Diode Forward Voltage[2]	V_{GS}=0V , I_S=10A , T_J=25℃	---	---	1.2	V
trr	Reverse Recovery Time	IF=20A , dI/dt=100A/μs , T_J=25℃	---	55	---	nS
Q_{rr}	Reverse Recovery Charge		---	163	---	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 .The EAS data shows Max. rating .

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

4、EAS condition: T_J=25℃, V_{DD}= 50V, V_G= 10V, R_G=25Ω, L=0.5mH, I_{AS}= 30A

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

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Typical Characteristics

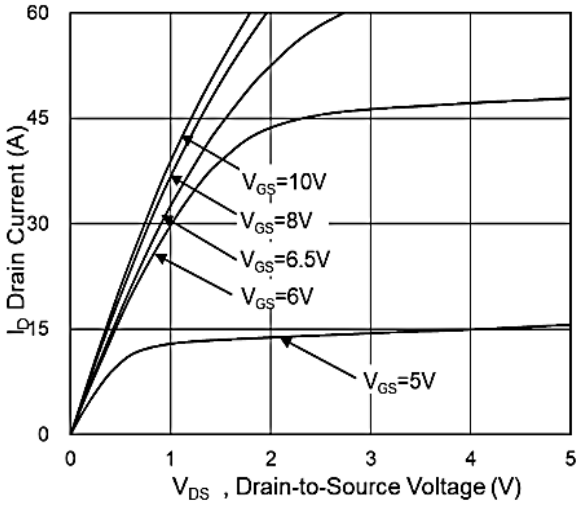

Fig.1 Typical Output Characteristics

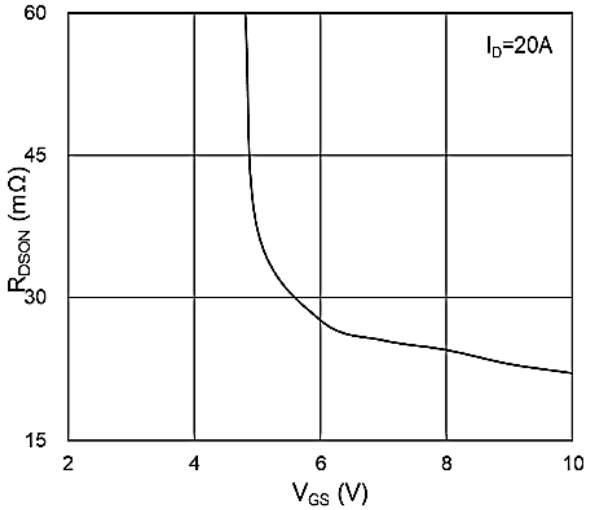

Fig.2 On-Resistance vs G-S Voltage

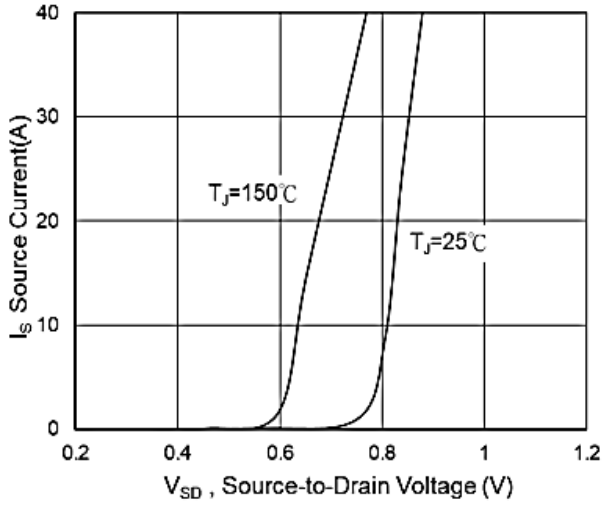

Fig.3 Source Drain Forward Characteristics

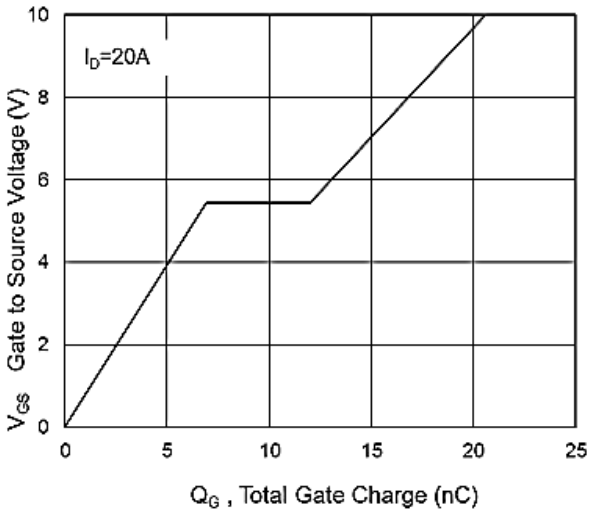

Fig.4 Gate-Charge Characteristics

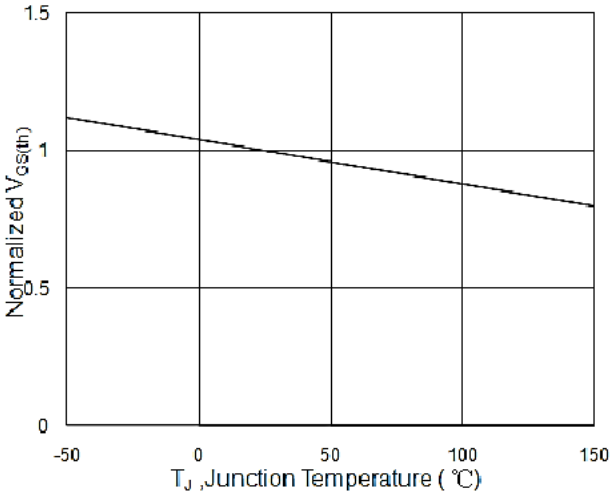

Fig.5 Normalized $V_{GS(th)}$ vs T_J

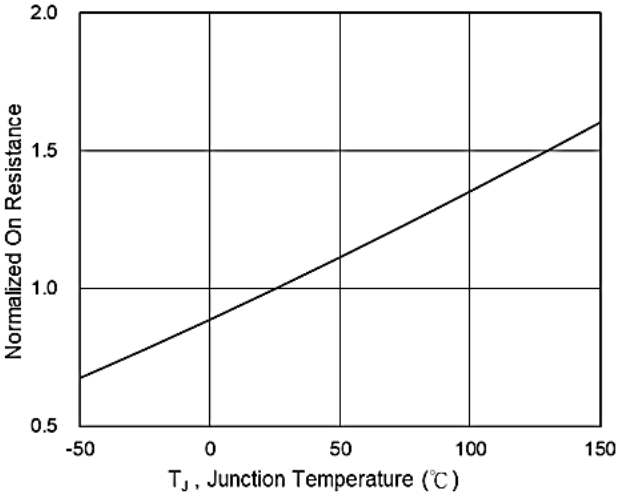

Fig.6 Normalized R_{DSON} vs T_J

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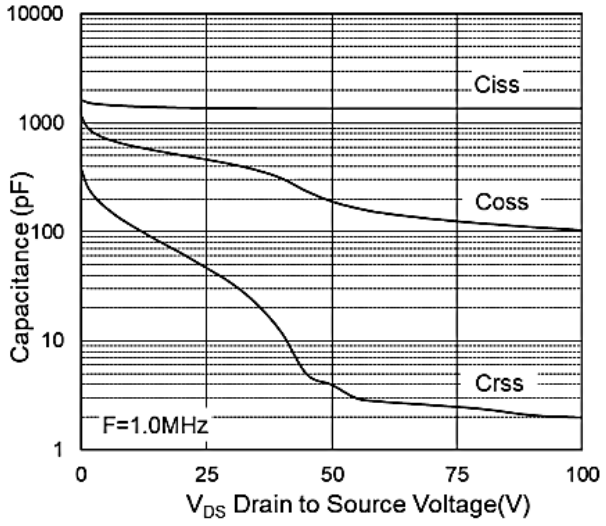

Fig.7 Capacitance

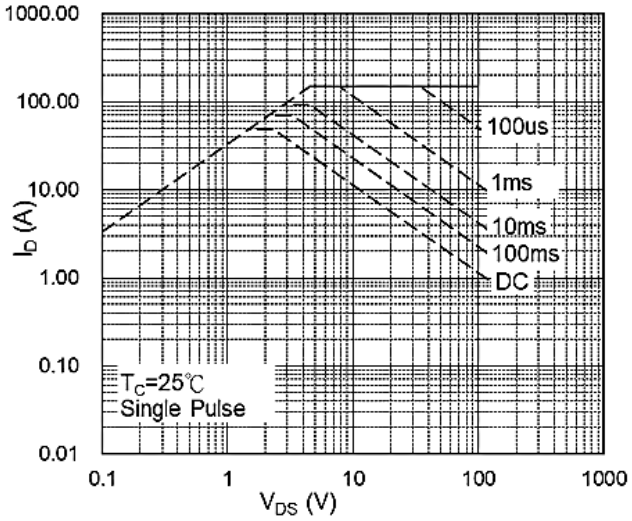

Fig.8 Safe Operating Area

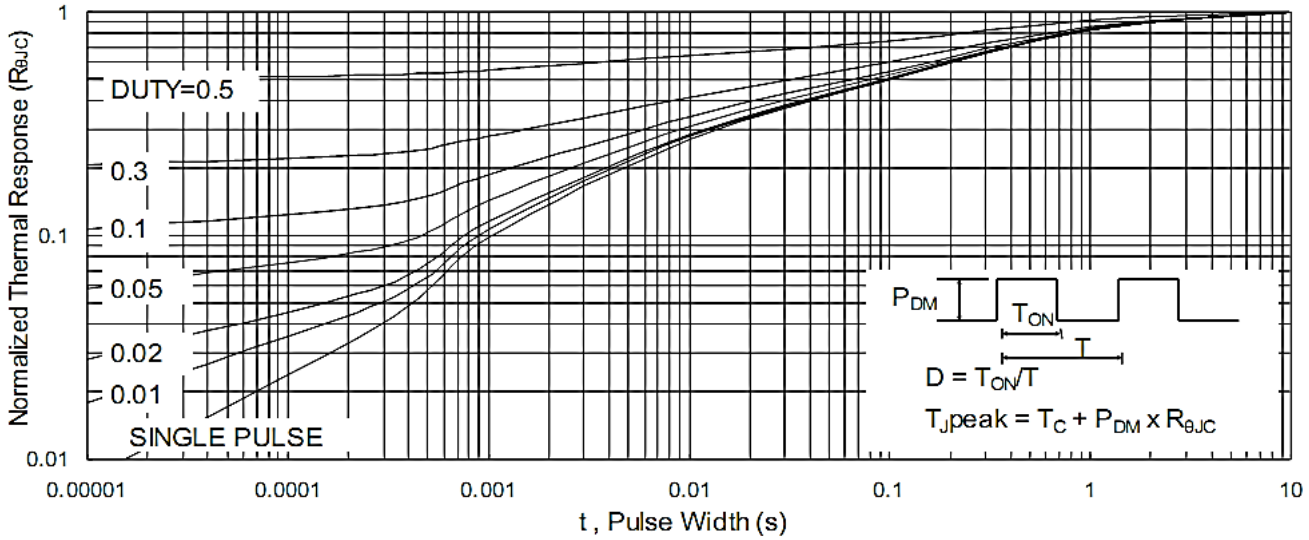

Fig.9 Normalized Maximum Transient Thermal Impedance

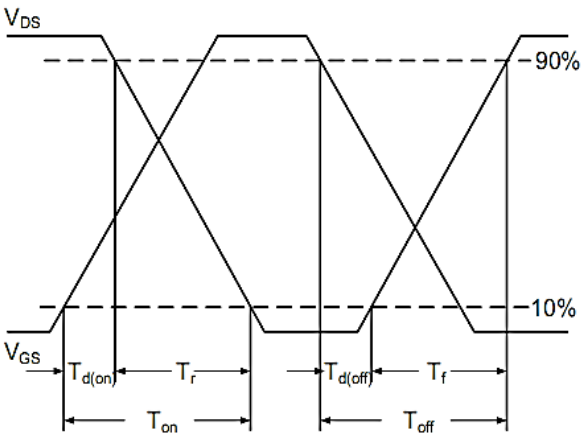

Fig.10 Switching Time Waveform

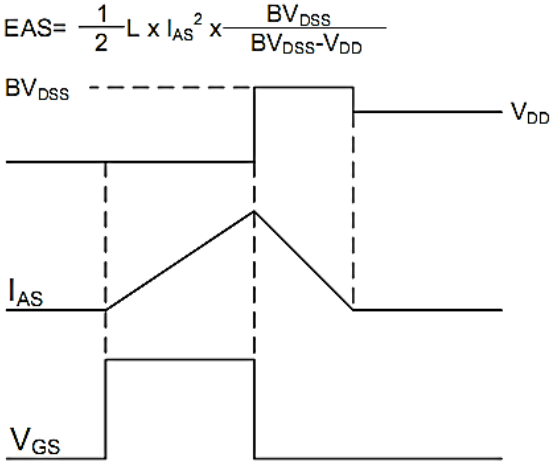

Fig.11 Unclamped Inductive Switching Waveform

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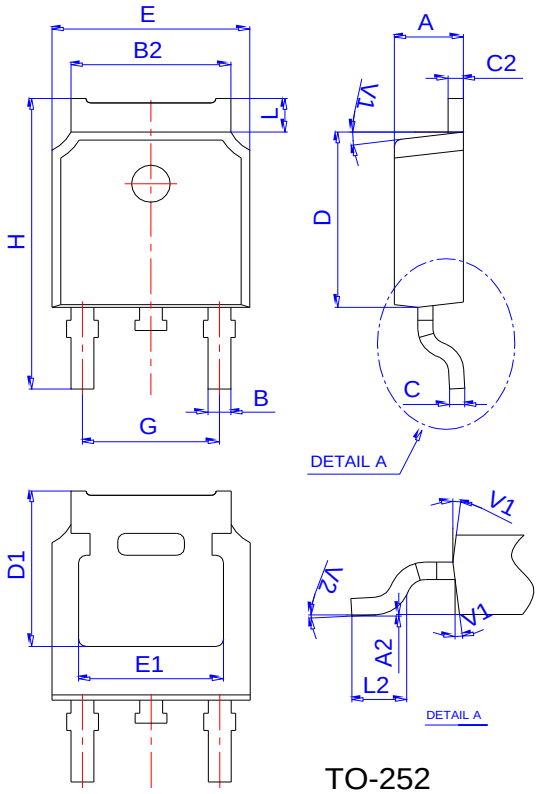
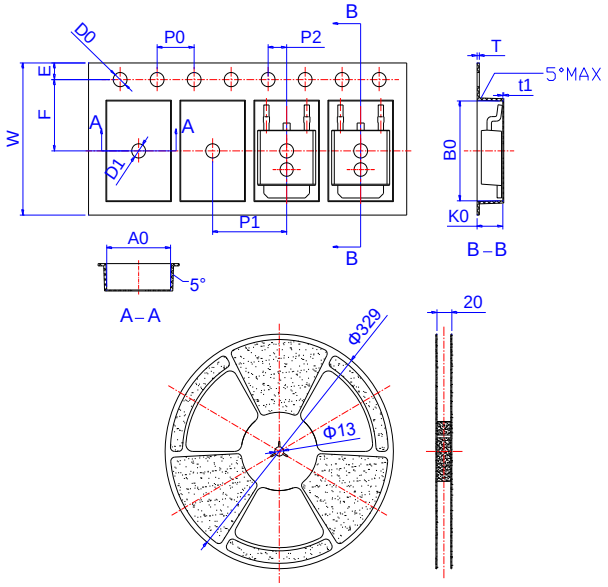
Package Mechanical Data:TO-252-3L



TO-252

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.10		2.50	0.083		0.098
A2	0		0.10	0		0.004
B	0.66		0.86	0.026		0.034
B2	5.18		5.48	0.202		0.216
C	0.40		0.60	0.016		0.024
C2	0.44		0.58	0.017		0.023
D	5.90		6.30	0.232		0.248
D1	5.30REF			0.209REF		
E	6.40		6.80	0.252		0.268
E1	4.63			0.182		
G	4.47		4.67	0.176		0.184
H	9.50		10.70	0.374		0.421
L	1.09		1.21	0.043		0.048
L2	1.35		1.65	0.053		0.065
V1		7°			7°	
V2	0°		6°	0°		6°

Reel Specification-TO-252



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
W	15.90	16.00	16.10	0.626	0.630	0.634
E	1.65	1.75	1.85	0.065	0.069	0.073
F	7.40	7.50	7.60	0.291	0.295	0.299
D0	1.40	1.50	1.60	0.055	0.059	0.063
D1	1.40	1.50	1.60	0.055	0.059	0.063
P0	3.90	4.00	4.10	0.154	0.157	0.161
P1	7.90	8.00	8.10	0.311	0.315	0.319
P2	1.90	2.00	2.10	0.075	0.079	0.083
A0	6.85	6.90	7.00	0.270	0.271	0.276
B0	10.45	10.50	10.60	0.411	0.413	0.417
K0	2.68	2.78	2.88	0.105	0.109	0.113
T	0.24		0.27	0.009		0.011
t1	0.10			0.004		
10P0	39.80	40.00	40.20	1.567	1.575	1.583