AP70N02D

20V N-Channel Enhancement Mode MOSFET

Description

The AP70N02D uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a Battery protection or in other Switching application.

General Features

V_{DS} = 20V I_D =70A

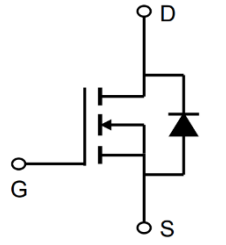
$R_{DS(ON)}$ < 4.0mΩ@ V_{GS}=4.5V **(Type：3.1mΩ)**

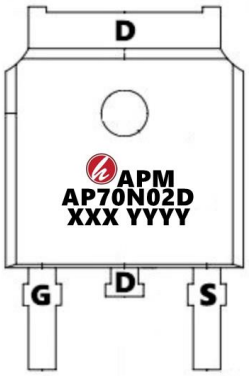
Application

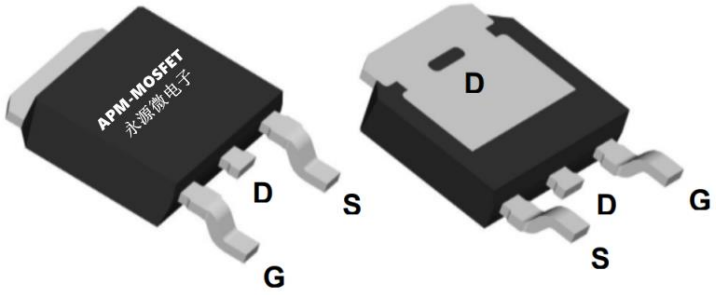
Battery protection

Load switch

Uninterruptible power supply







Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
AP70N02D	TO-252-3L	AP70N02D XXX YYYY	2500

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

Symbol	Parameter	Max.	Units
VDSS	Drain-Source Voltage	20	V
VGSS	Gate-Source Voltage	±12	V
ID@TA=25℃	Continuous Drain Current, VGS @ 4.5V	70	A
ID@TA=70℃	Continuous Drain Current, VGS @ 4.5V	38	A
IDM	Pulsed Drain Current note1	210	A
EAS	Single Pulsed Avalanche Energy note2	56.2	mJ
IAS	Avalanche Current	38	A
PD@TA=25℃	Power Dissipation	57	W
TJ, TSTG	Operating and Storage Temperature Range	-55 to +175	℃
RθJA	Thermal Resistance Junction-Ambient [1]	62	℃/W
RθJC	Thermal Resistance, Junction to Case	2.63	℃/W

20V N-Channel Enhancement Mode MOSFET

Electrical Characteristics (T_C=25℃unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V(BR)DSS	Drain-Source Breakdown Voltage	I_D = 250μA, V_{GS} = 0V	20	21	-	V
IDSS	Zero Gate Voltage Drain Current	V_{DS} = 20V, V_{GS} = 0V	-	-	1.0	μA
IGSS	Gate-Body Leakage Current	V_{DS} = 0V, V_{GS} = ±12V	-	-	±100	nA
VGS(th)	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250μA	0.5	0.8	1.1	V
RDS(ON)	Static Drain-Source ON	V_{GS} = 4.5V, I_D = 30A	-	3.1	4.0	mΩ
		V_{GS} = 2.5V, I_D = 20A	-	3.9	5.0	mΩ
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=10V, f=1MHz	-	3174	-	pF
Coss	Output Capacitance		-	396	-	pF
C_{rss}	Reverse Transfer Capacitance		-	365	-	pF
Q_g	Total Gate Charge	V_{GS}=0 to 4.5V V_{DD}=10V, I_D=30A	-	36	-	nC
Q_{gs}	Gate Source Charge		-	6	-	nC
Q_{gd}	Gate Drain("Miller") Charge		-	10	-	nC
td(on)	Turn-On DelayTime	V_{GS} = 4.5V, V_{DD} = 10V I_D= 30A, R_{GEN} = 3Ω	-	13	-	ns
t_r	Turn-On Rise Time		-	31	-	ns
td(off)	Turn-Off DelayTime		-	73	-	ns
t_f	Turn-Off Fall Time		-	92	-	ns
IS	Maximum Continuous Drain to Source Diode Forward Current		-	-	70	A
ISM	Maximum Pulsed Drain to Source Diode Forward Current		-	-	300	A
V_{SD}	Drain to Source Diode Forward Voltage	V_{GS} = 0V, I_S = 30A	-	-	1.2	V
trr	Body Diode Reverse Recovery Time	I_F=20A,di/dt=100A/μs	-	13	-	ns
Qrr	Body Diode Reverse Recovery Charge		-	4	-	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 EAS condition: T_J=25℃, V_{DD}=16V, V_G=4.5V, R_G=25Ω, L=0.1mH, I_{AS}=38A
4、The power dissipation is limited by 175℃ 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

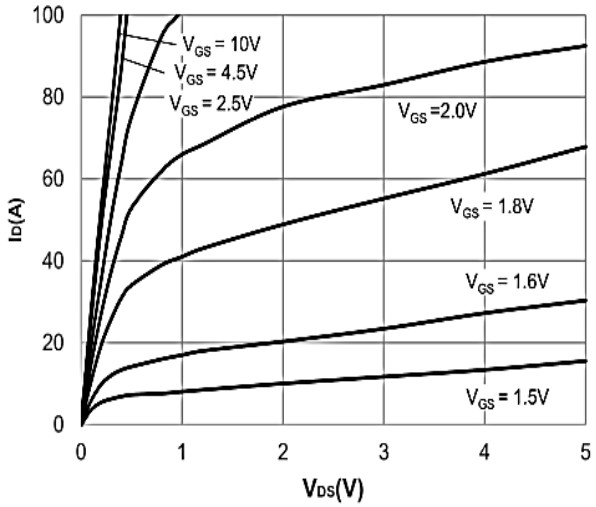


Figure1: Output Characteristics

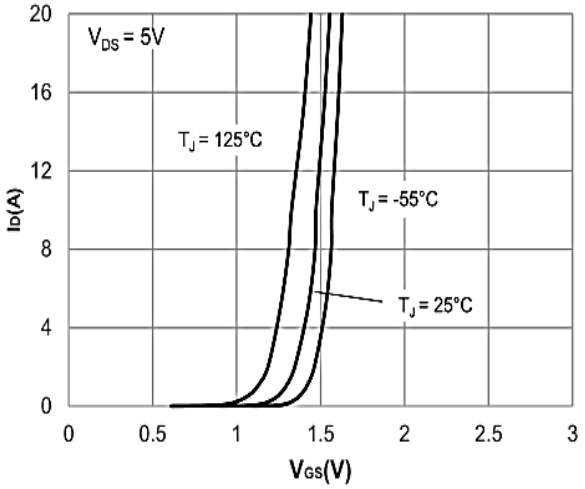


Figure 2: Typical Transfer Characteristics

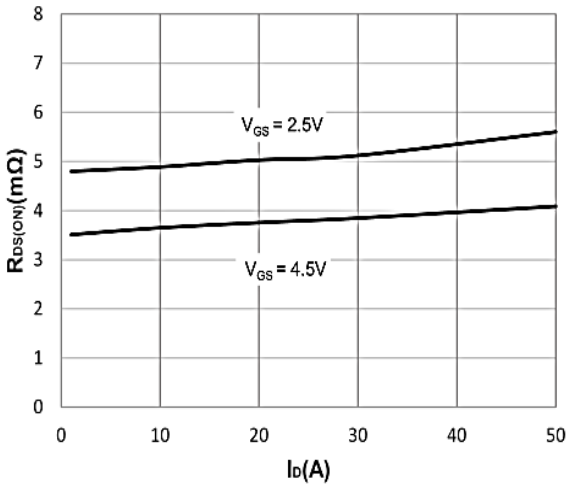


Figure 3:On-resistance vs. Drain Current

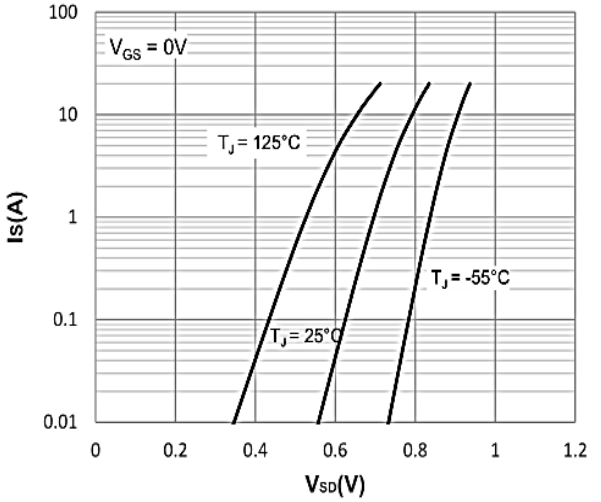


Figure 4: Body Diode Characteristics

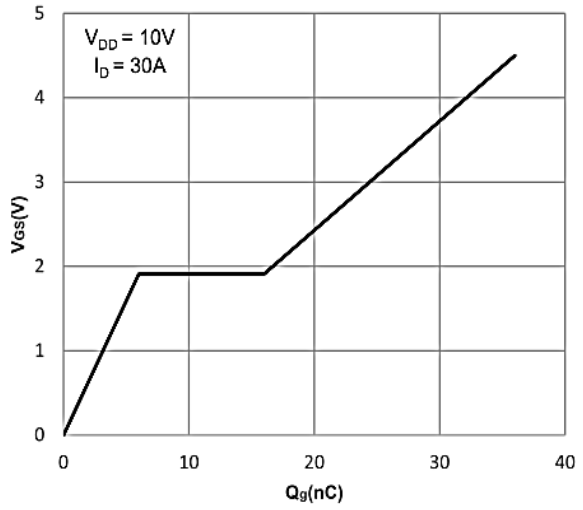


Figure 5: Gate Charge Characteristics

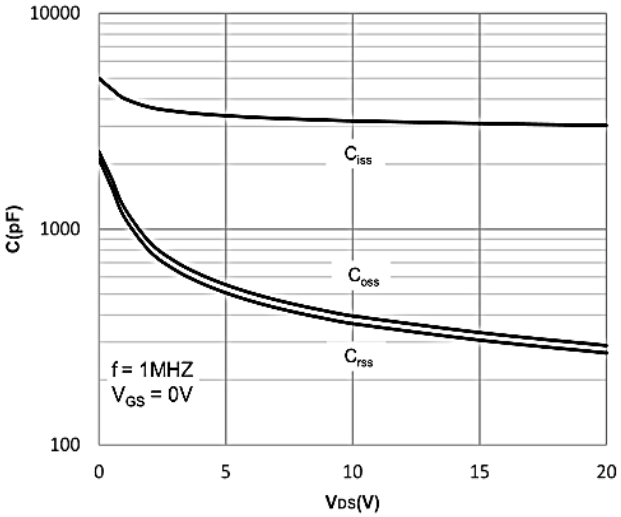


Figure 6: Capacitance Characteristics

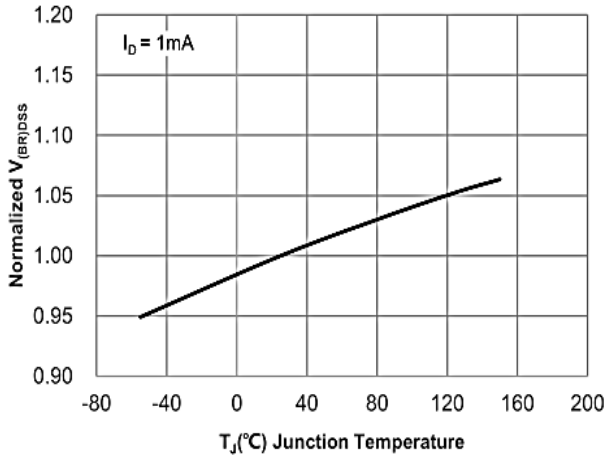


Figure 7: Normalized Breakdown Voltage vs Junction Temperature

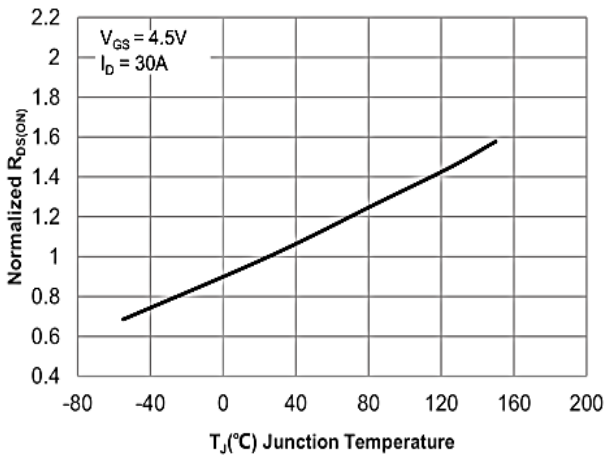


Figure 8: Normalized on Resistance vs. Junction Temperature

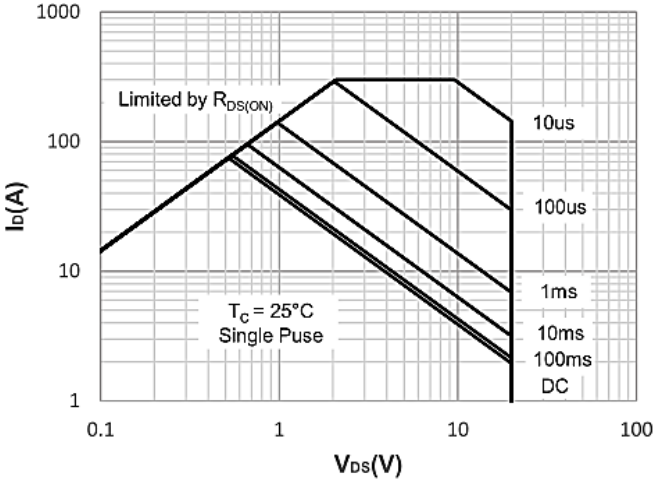


Figure 9: Maximum Safe Operating Area

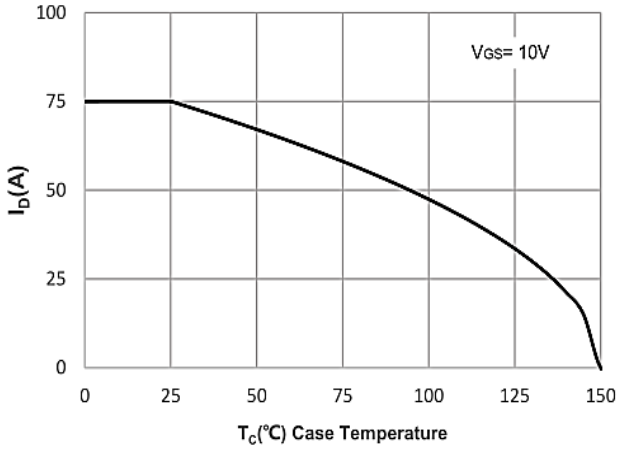


Figure 10: Maximum Continuous Drain Current vs. Ambient Temperature

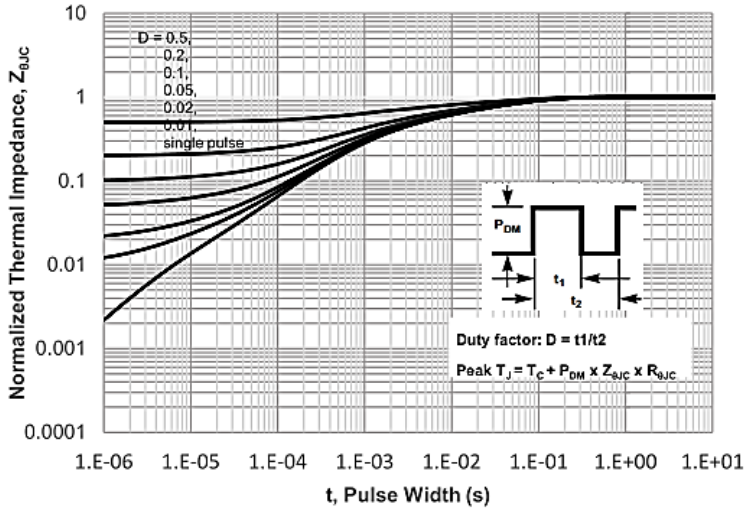
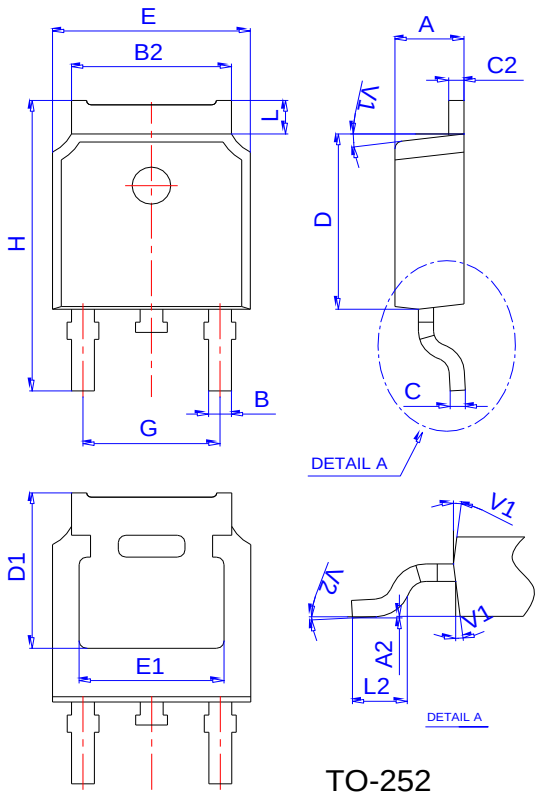


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Ambien

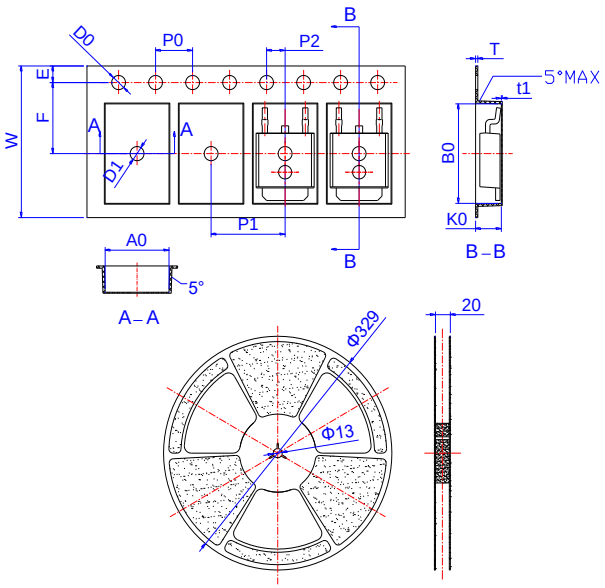
Package Mechanical Data:TO-252-3L



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 Spectification-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

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Edition	Date	Change
REV1.0	2023/8/05	Initial release