

-20V P-Channel Enhancement Mode MOSFET

Description

The AP150P02D 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

$V_{DS} = -20V$ $I_D = -150A$

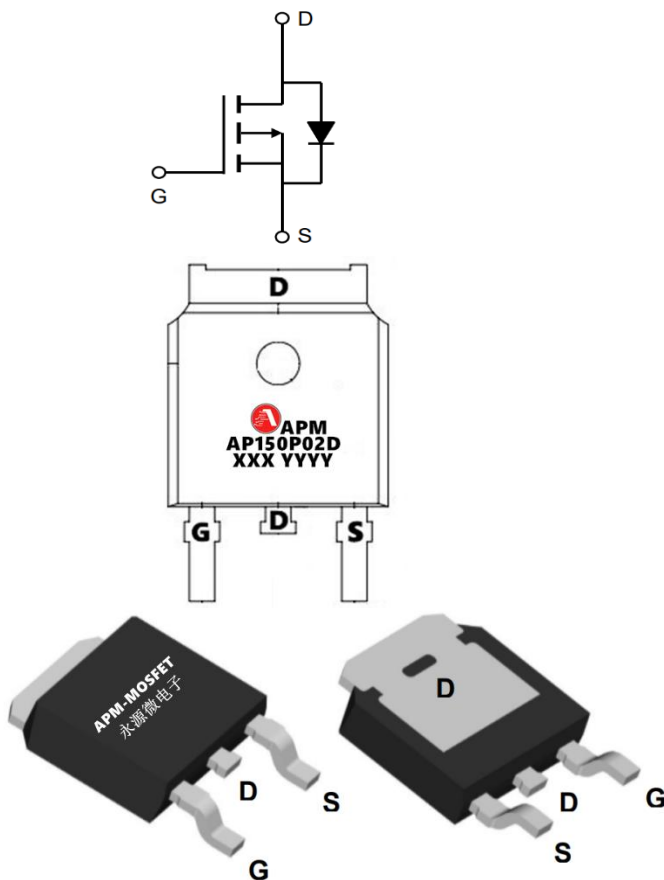
$R_{DS(ON)} < 2.5m\Omega$ @ $V_{GS} = -4.5V$ (Type: 2.1m Ω)

Application

Battery protection

Load switch

Uninterruptible power supply



Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
AP150P02D	TO-252-3L	AP150P02D XXX YYYY	2500

Absolute Maximum Ratings (TC=25°C unless otherwise noted)

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	-20	V
V_{GS}	Gate-Source Voltage	± 12	V
$I_{D@TC=25^\circ C}$	Continuous Drain Current, $V_{GS} @ -10V$	-150	A
$I_{D@TC=100^\circ C}$	Continuous Drain Current, $V_{GS} @ -10V$	-76	A
I_{DM}	Pulsed Drain Current ²	450	A
E_{AS}	Single Pulse Avalanche Energy ³	450	mJ
I_{AS}	Avalanche Current	-50	A
$P_{D@TC=25^\circ C}$	Total Power Dissipation ⁴	104	W
T_{STG}	Storage Temperature Range	-55 to 150	°C
T_J	Operating Junction Temperature Range	-55 to 150	°C
$R_{\theta JA}$	Thermal Resistance Junction-Ambient ¹	15	°C/W
$R_{\theta JC}$	Thermal Resistance Junction-Case ¹	0.9	°C/W

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Electrical Characteristics ($T_J=25^{\circ}\text{C}$, unless otherwise noted)

Symbol	Parameter	Test Condition	Min	Type	Max	Units
V _{DS}	Drain-source breakdown voltage	$V_{GS}=0V, I_D = -250\mu A$	-20	-	-	V
I _{GSS}	Gate-source leakage	$V_{DS}=0V, V_{GS}=\pm 12V$	-	-	± 100	nA
I _{DSS}	Zero gate voltage drain current	$V_{DS}=-20V, V_{GS}=0V$	-	-	-1	μA
V _{GS(th)}	Gate-source threshold voltage	$V_{DS}=V_{GS}, I_D=-250\mu A$	-0.5	-0.7	-1.2	V
R _{DS(on)}	Drain-source on-state resistance	$V_{GS}=-4.5V, I_D=-20A$	-	2.1	2.5	m Ω
		$V_{GS}=-2.5V, I_D=-15A$	-	2.6	3.2	
g _{fs}	Forward transconductance ^a	$V_{DS}=-10V, I_D=-25A$	-	120	-	S
R _g	Gate resistance	f=1MHz	-	1.5	2.5	Ω
C _{iss}	Input capacitance	$V_{DS}=-10V, V_{GS}=0V, f=1MHz$	-	22000	-	pF
C _{oss}	Output capacitance		-	2470	-	pF
C _{rss}	Reverse transfer capacitance		-	2515	-	pF
Q _{gs}	Gate-source charge	$V_{DS}=-10V, V_{GS}=-4.5V, I_D=-20A$	-	32.5	-	nC
Q _{gd}	Gate-drain charge		-	51.5	-	nC
Q _g	Total gate charge	$V_{DS}=-10V, V_{GS}=-10V, I_D=20A$	-	202.5	-	nC
t _{d(on)}	Turn-on delay time	$V_{DD}=-10V, R_L=1\Omega, V_{GEN}=-4.5V, R_g=1\Omega$	-	20	40	ns
t _r	Rise time		-	14	28	ns
t _{d(on)}	Turn-on delay time		-	115	200	ns
t _{d(off)}	Turn-off delay time		-	230	390	ns
I _S	Continuous source-drain diode current	$T_C = 25^{\circ}\text{C}$	-	-	-150	A
I _{SM}	Pulse diode forward current		-	-	-450	A
V _{SD}	Body diode voltage	$I_S = -5A, V_{GS} = 0V$	-	-0.64	-1.1	V
t _{rr}	Body diode reverse recovery time	$I_F=-10A, di/dt=100A/\mu s, T_J=25^{\circ}\text{C}$	-	88	140	ns
Q _{rr}	Body diode reverse recovery charge		-	120	200	nC

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 $\leq 300\mu s$, duty cycle $\leq 2\%$
- 3、The EAS data shows Max. rating . The test condition is $V_{DD}=-16V, V_{GS}=-4.5V, L=0.1mH, I_{AS}=-50A$
- 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.

Typical Characteristics

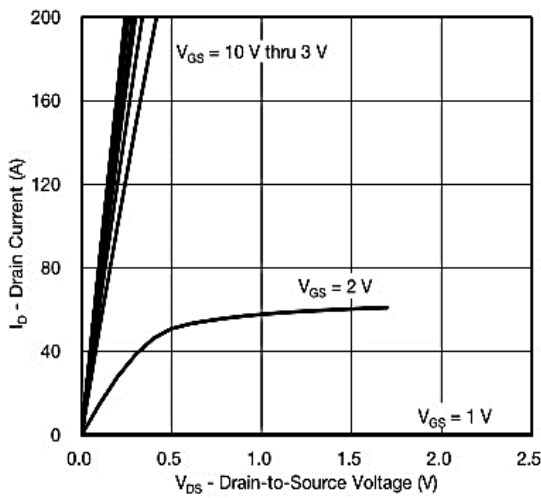


Figure1: Output Characteristics

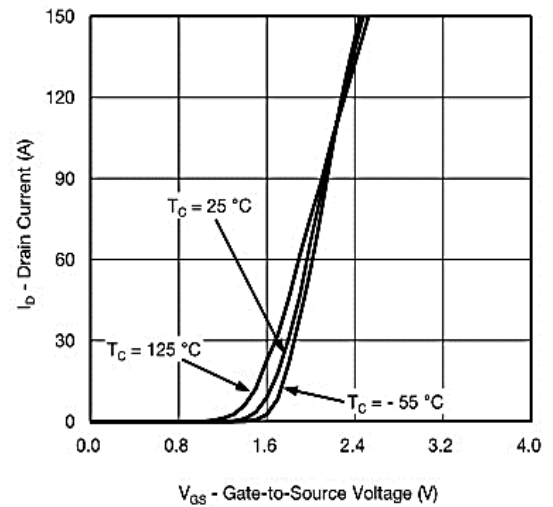


Figure 2: Transfer Characteristics

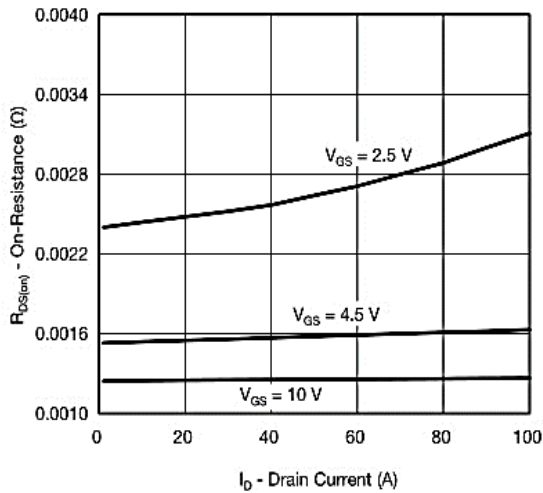


Figure 3: On-Resistance vs. Drain Current

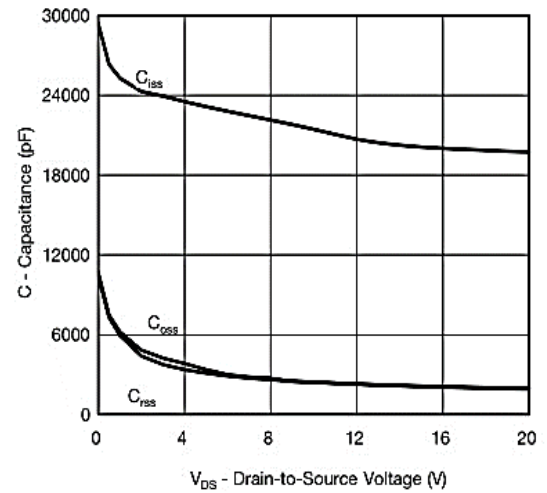


Figure 4: Capacitance

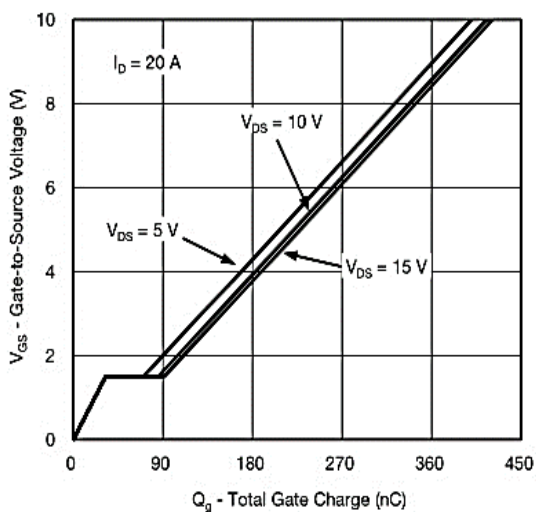


Figure 5: Gate Charge

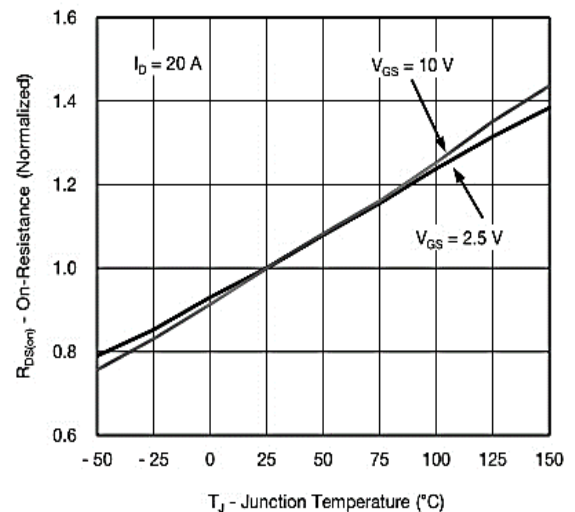


Figure 6: On-Resistance vs. Junction Temperature

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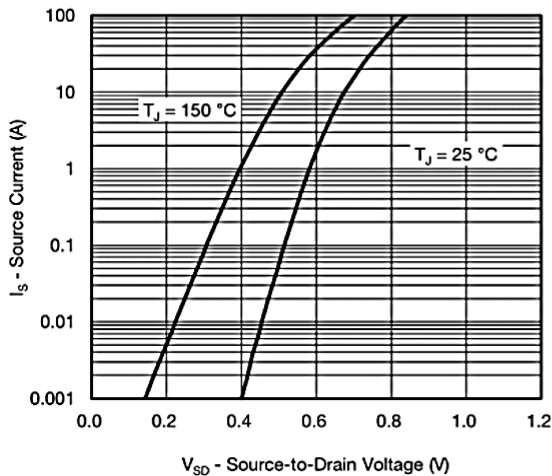


Figure 7: Source-Drain Diode Forward Voltage

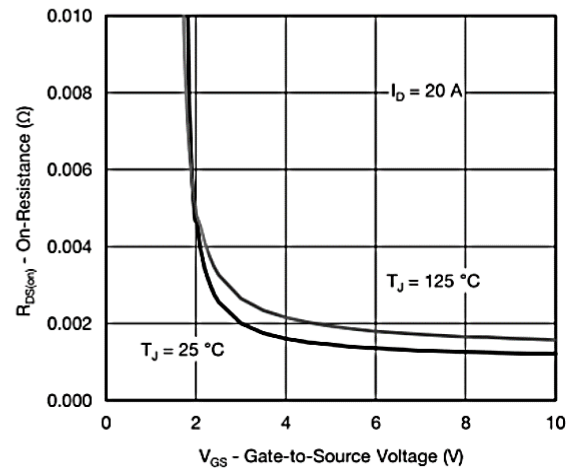


Figure 8: On-Resistance vs. Gate-to-Source Voltage

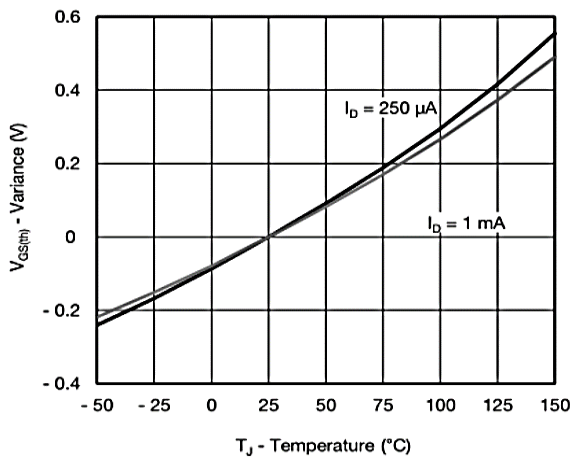


Figure 9: Maximum Safe Operating Area

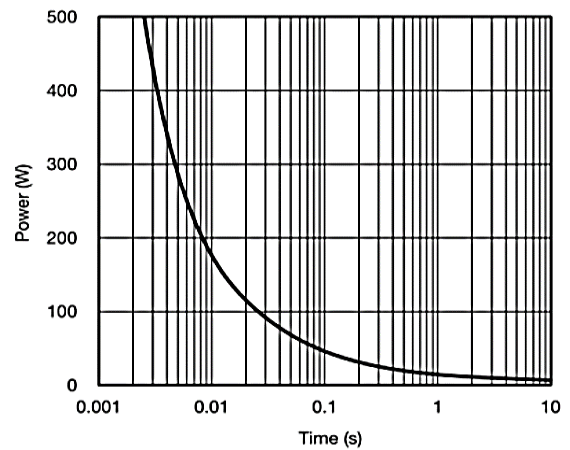


Figure 10: Maximum Continuous Drain Current vs. Case Temperature

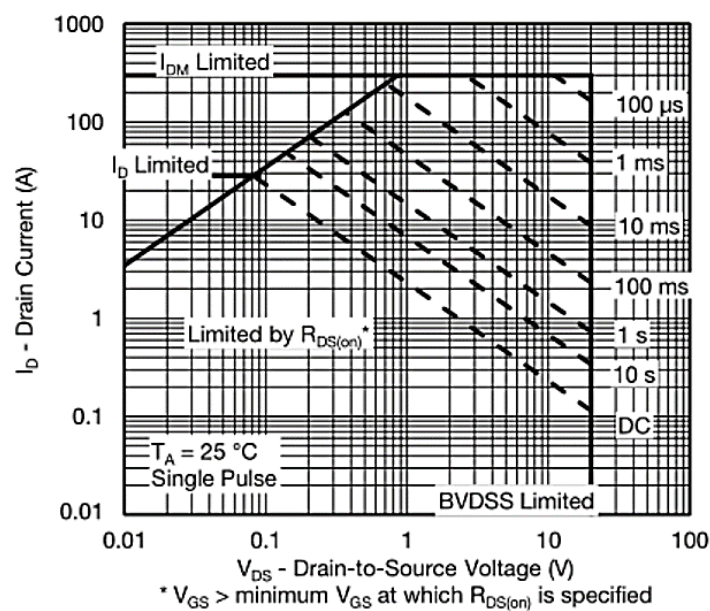
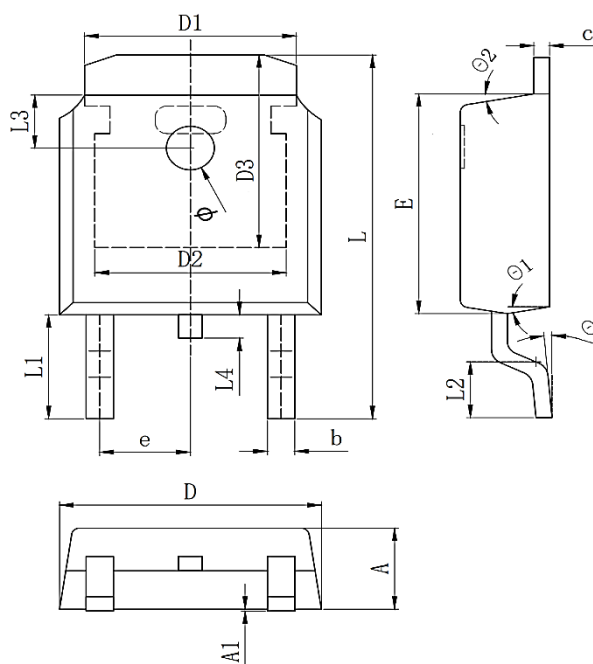


Figure 11: Safe Operating Area

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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Edition	Date	Change
REV1.0	2023/10/8	Initial release

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