

-30V P-Channel Enhancement Mode MOSFET

Description

The AP50P03D 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

$V_{DS} = -30V$ $I_D = -50A$

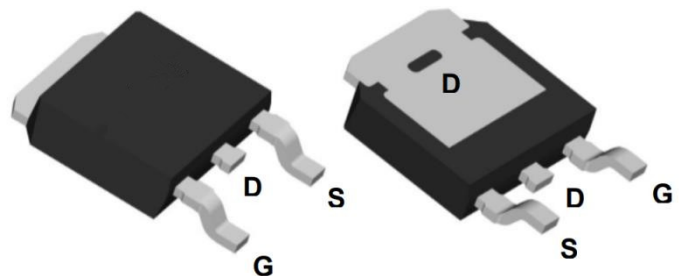
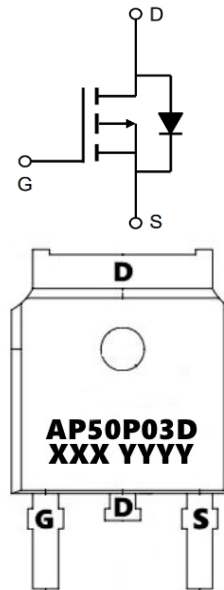
$R_{DS(ON)} < 16m\Omega$ @ $V_{GS} = -10V$ (Type: 10.5m Ω)

Application

Lithium battery protection

Wireless impact

Mobile phone fast charging



Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
AP50P03D	TO-252-3L	AP50P03D XXX YYYY	5000

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

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	-30	V
V_{GS}	Gate-Source Voltage	± 20	V
$I_D @ T_A = 25^\circ C$	Continuous Drain Current, $V_{GS} @ -10V^1$	-50	A
$I_D @ T_A = 70^\circ C$	Continuous Drain Current, $V_{GS} @ -10V^1$	-23	A
I_{DM}	Pulsed Drain Current ²	-120	A
E_{AS}	Single Pulse Avalanche Energy ³	68	mJ
I_{AS}	Avalanche Current	-29.4	A
$P_D @ T_A = 25^\circ C$	Total Power Dissipation ⁴	310	W
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ C$
T_J	Operating Junction Temperature Range	-55 to 150	$^\circ C$
$R_{\theta JA}$	Thermal Resistance Junction-Ambient ¹	62.5	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance Junction-Case ¹	24	$^\circ C/W$

-30V P-Channel Enhancement Mode MOSFET

Electrical Characteristics (T_J=25°C, unless otherwise noted)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
V(BR)DSS	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D = -250μA	-30	-32.5	-	V
IDSS	Zero Gate Voltage Drain Current	V _{DS} = -30V, V _{GS} =0V,	-	-	-1	μA
IGSS	Gate to Body Leakage Current	V _{DS} =0V, V _{GS} = ±20V	-	-	±100	nA
VGS(th)	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D = -250μA	-1.2	-1.5	-2.5	V
RDS(on)	Static Drain-Source on-Resistance note3	V _{GS} = -10V, I _D = -10A	-	10.5	16	mΩ
		V _{GS} = -4.5V, I _D = -5A	-	16	20	
Rg	Gate Resistance	V _{DS} =0V, V _{GS} =0V, f=1MHz	4.9	7.0	9.1	Ω
Ciss	Input Capacitance	V _{DS} = -24V, V _{GS} =10V, f=1.0MHz	-	2130	-	pF
Coss	Output Capacitance		-	280	-	pF
Crss	Reverse Transfer Capacitance		-	252	-	pF
Qg	Total Gate Charge	V _{DS} = -24V, I _D = -1A, V _{GS} = -10V	-	22	-	nC
Qgs	Gate-Source Charge		-	4	-	nC
Qgd	Gate-Drain("Miller") Charge		-	5.8	-	nC
td(on)	Turn-on Delay Time	V _{DD} = -24V, I _D = -1A, V _{GS} = -10V, R _{GEN} =7.0Ω	-	9	-	ns
t _r	Turn-on Rise Time		-	13	-	ns
td(off)	Turn-off Delay Time		-	48	-	ns
t _f	Turn-off Fall Time		-	20	-	ns
IS	Maximum Continuous Drain to Source Diode Forward Current		-	-	-29.5	A
ISM	Maximum Pulsed Drain to Source Diode Forward Current		-	-	-44	A
VSD	Drain to Source Diode Forward Voltage	V _{GS} =0V, I _S = -1A	-	-0.74	-1.2	V

Note :

- 1、The data tested by surface mounted on a 1 inch 2 FR-4 board with 20Z copper.
- 2、The data tested by pulsed , pulse width .The EAS data shows Max. rating .
- 3、The power dissipation is limited by 175°C junction temperature
- 4、EAS condition: T_J=25°C, V_{DD}= -24V, V_G= -10V, R_G=7Ω, L=0.1mH, I_{AS}= -29.5A
- 5、The data is theoretically the same as ID and IDM , in real applications , should be limited by total power dissipation.

-30V P-Channel Enhancement Mode MOSFET

Typical Characteristics

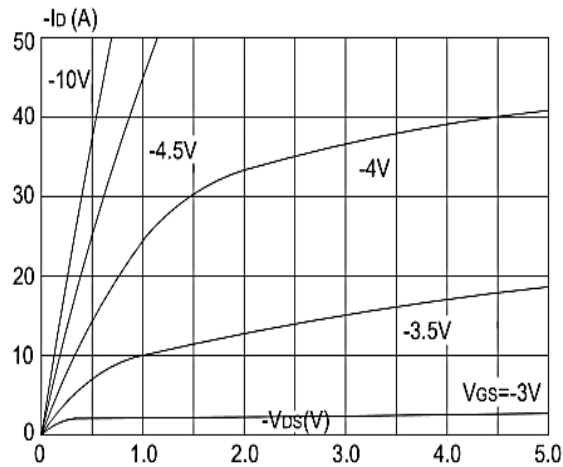


Figure1: Output Characteristics

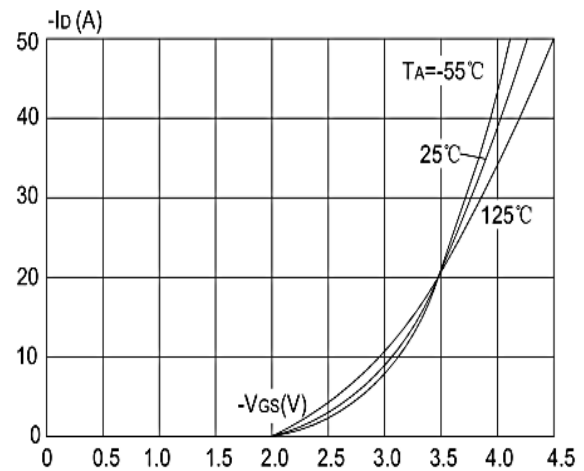


Figure2: Typical Transfer Characteristics

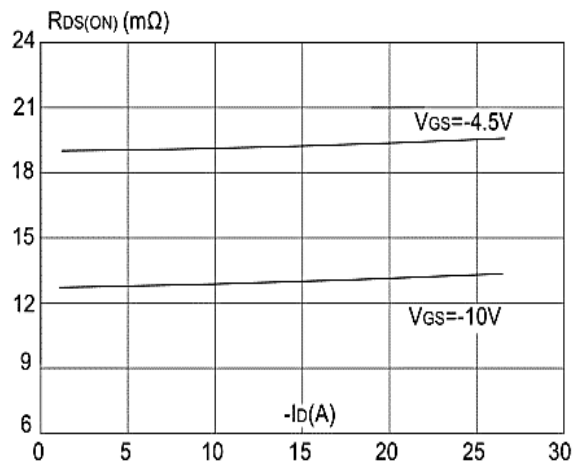


Figure 3: On-resistance vs. Drain Current

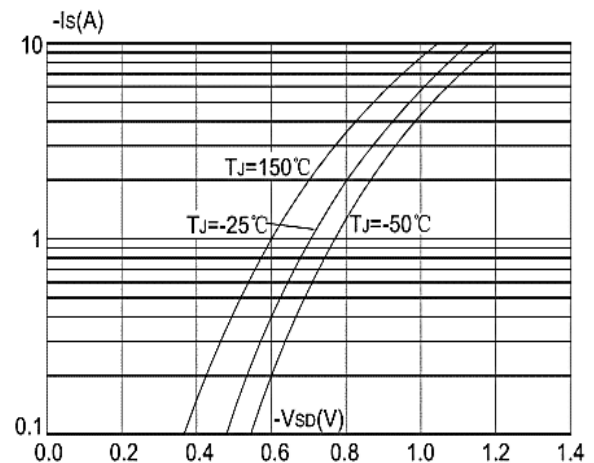


Figure 4: Body Diode Characteristics

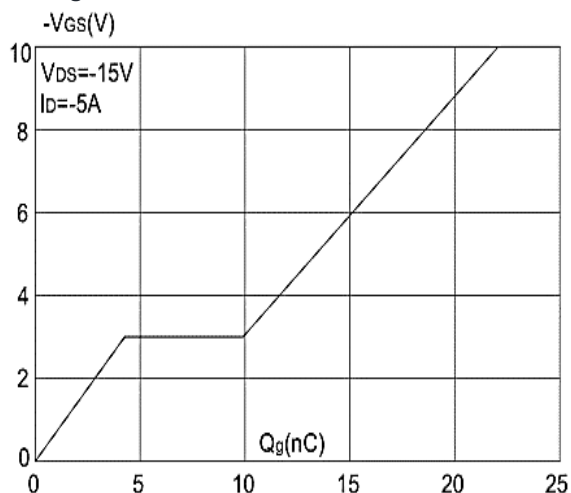


Figure 5: Gate Charge Characteristics

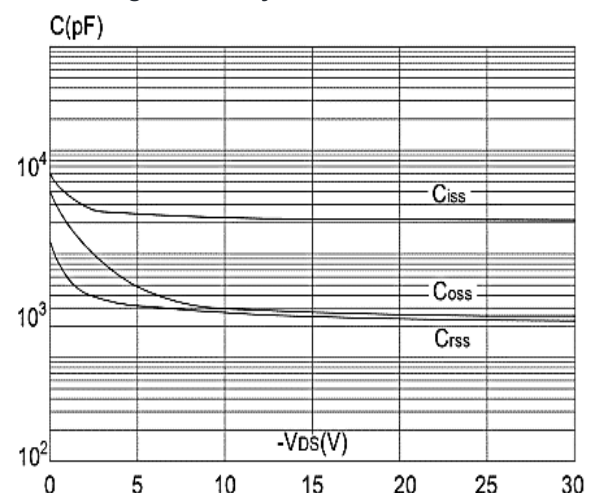


Figure 6: Capacitance Characteristics

-30V P-Channel Enhancement Mode MOSFET

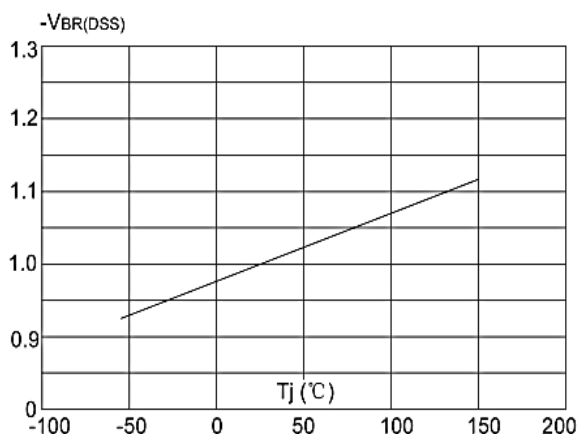


Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

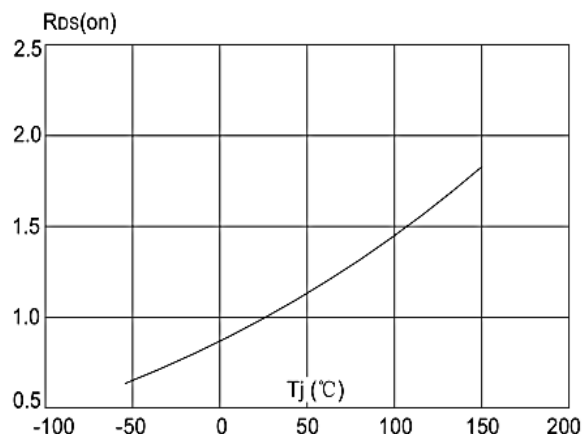


Figure 8: Normalized on Resistance vs. Junction Temperature

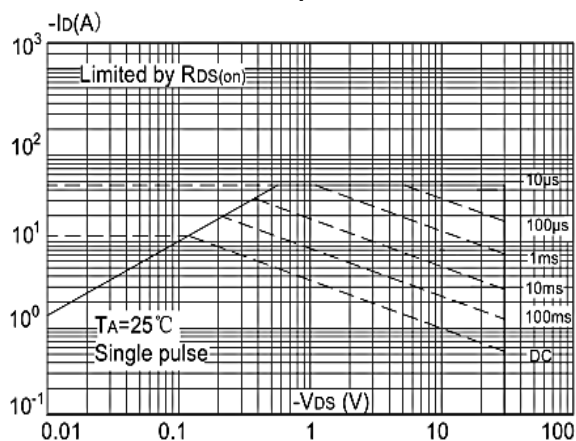


Figure 9: Maximum Safe Operating Area

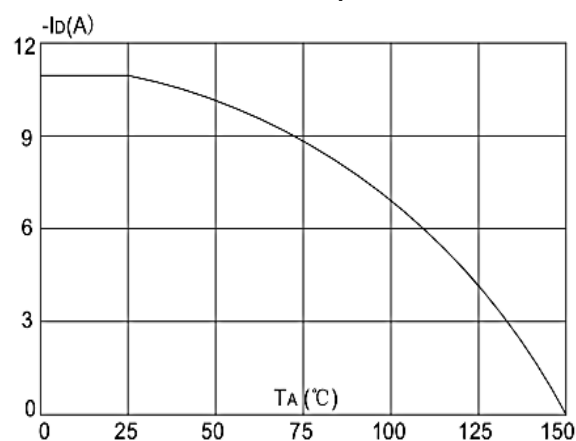


Figure 10: Maximum Continuous Drain Current vs. Ambient Temperature

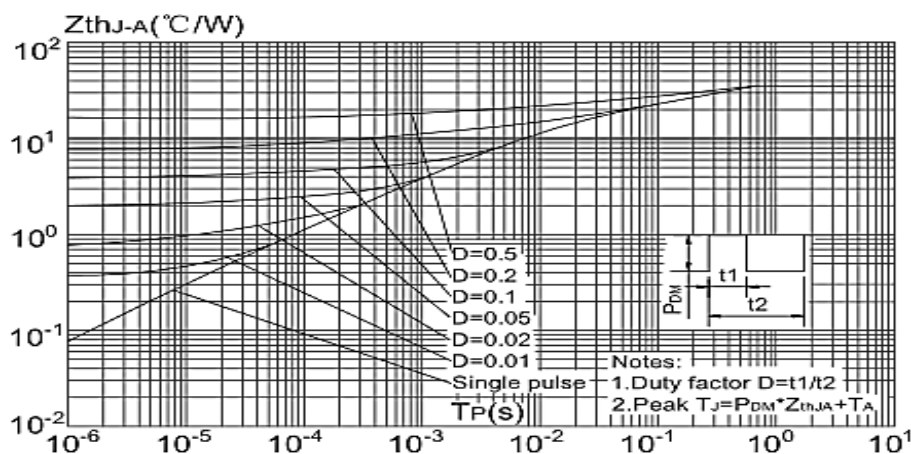
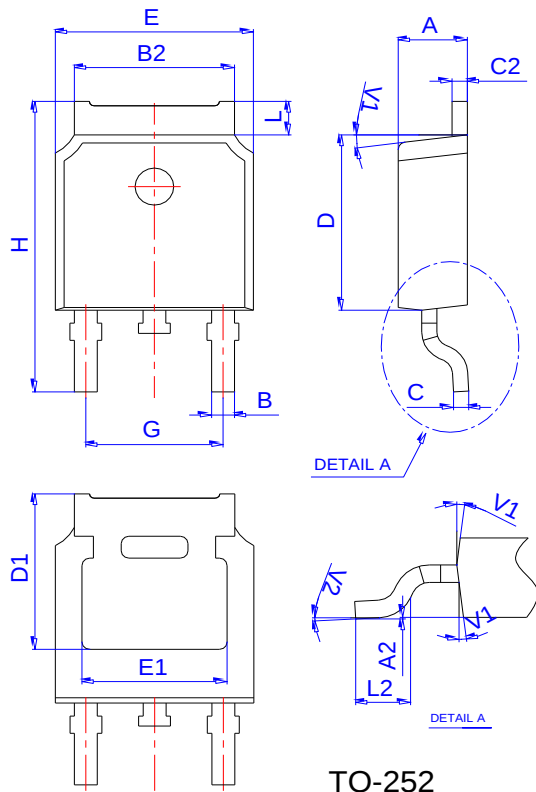


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

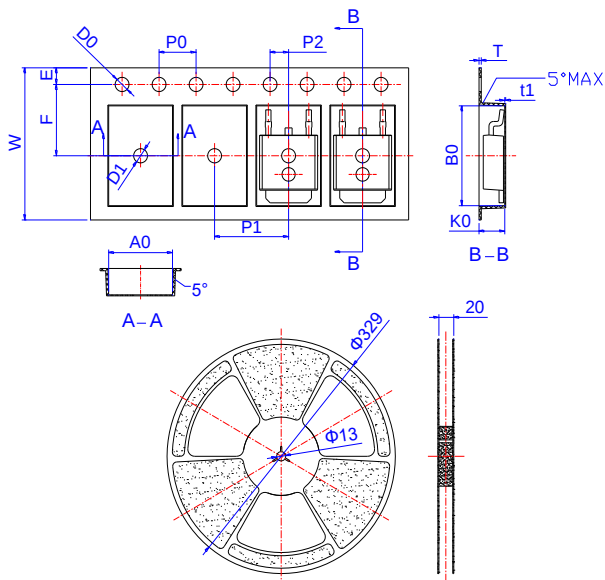
-30V P-Channel Enhancement Mode MOSFET

Package Mechanical Data:TO-252-3L



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