AP5P04MI

-40V P-Channel Enhancement Mode MOSFET

Description

The AP5P04MI 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} = -40V I_D =-5.0A

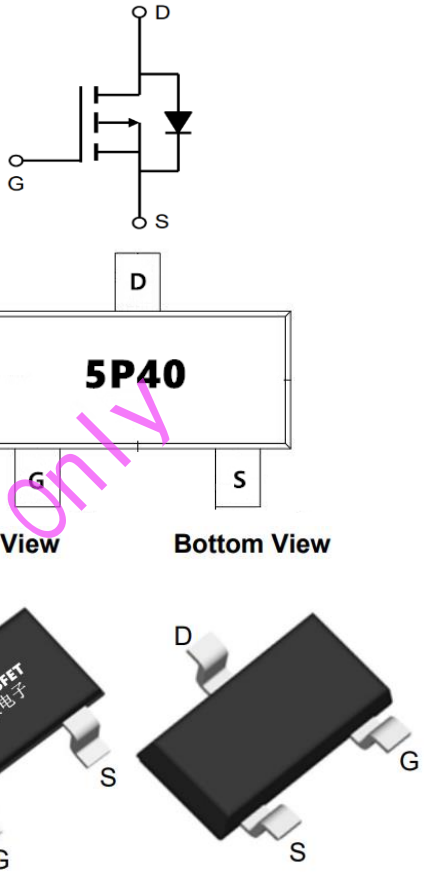
$R_{DS(ON)}$ < 72mΩ @ V_{GS}=-10V **（Type：65mΩ）**

Application

Battery protection

Load switch

Uninterruptible power supply



Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
AP5P04MI	SOT23-3L	5P40	3000

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

Symbol	Parameter	Steady State	Units
VDS	Drain-Source Voltage	-40	V
VGS	Gate-Source Voltage	±20	V
I_D@T_A=25℃	Continuous Drain Current, V_{GS} @ -4.5V[1]	-5.0	A
I_D@T_A=70℃	Continuous Drain Current, V_{GS} @ -4.5V[1]	-3.0	A
IDM	Pulsed Drain Current[2]	-16.1	A
P_D@T_A=25℃	Total Power Dissipation[3]	1.32	W
P_D@T_A=70℃	Total Power Dissipation[3]	0.84	W
TSTG	Storage Temperature Range	-55 to 150	℃
T_J	Operating Junction Temperature Range	-55 to 150	℃
$R_{\theta}JA$	Thermal Resistance Junction-Ambient [1]	125	℃/W
$R_{\theta}JC$	Thermal Resistance Junction-Case[1]	80	℃/W

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

Symbol	Parameter	Conditions	Min.	Typ	Max.	Unit
BVDSS	Drain-Source Breakdown Voltage	V_{GS}=0V , I_D=-250uA	-40	-46	---	V
△BVDSS/△TJ	BV_{DSS} Temperature Coefficient	Reference to 25℃ , I_D=-1mA	---	-0.018	---	V/℃
RDS(ON)	Static Drain-Source On-Resistance[2]	V_{GS}=-4.5V , I_D=-3A	---	65	72	mΩ
		V_{GS}=-2.5V , I_D=-2A	---	89	100	
VGS(th)	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =-250uA	-1.0	-1.5	-2.5	V
△$V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	2.5	---	mV/℃
IDSS	Drain-Source Leakage Current	V_{DS}=-24V , V_{GS}=0V ,T_J=25℃	---	---	-1	uA
		V_{DS}=-24V , 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=-3A	---	5.8	---	S
Q_g	Total Gate Charge (-4.5V)	V_{DS}=-32V , V_{GS}=-4.5V , I_D=-3A	---	6.4	---	nC
Qgs	Gate-Source Charge		---	2.1	---	
Qgd	Gate-Drain Charge		---	2.5	---	
Td(on)	Turn-On Delay Time	V_{DD}=-20V , V_{GS}=-4.5V , R_G=3.3Ω, I_D=-3A	---	4.2	---	ns
T_r	Rise Time		---	23	---	
Td(off)	Turn-Off Delay Time		---	26.8	---	
T_f	Fall Time		---	20.6	---	
Ciss	Input Capacitance	V_{DS}=-15V , V_{GS}=0V , f=1MHz	---	620	---	pF
Coss	Output Capacitance		---	65	---	
Crss	Reverse Transfer Capacitance		---	53	---	
IS	Continuous Source Current[1,4]	V_G=V_D=0V , Force Current	---	---	-5.2	A
ISM	Pulsed Source Current[2,4]		---	---	-16.1	A
VSD	Diode Forward Voltage[2]	V_{GS}=0V , I_S=-1A , T_J=25℃	---	---	-1	V

Note :

1、The data tested by surface mounted on a 1 inch FR-4 board with 2OZ copper.

2、The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦ 2%

3、The power dissipation is limited by 150℃ junction temperature

4、The data is theoretically the same as I_D and I_{DM} , in real applications , should be limited by total power dissipation.

Typical Characteristics

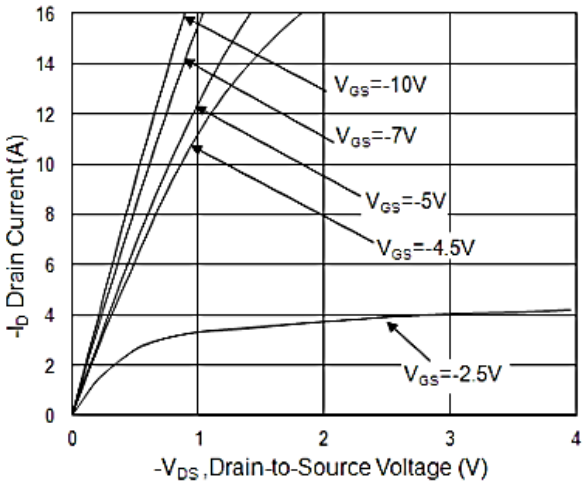

Fig.1 Typical Output Characteristics

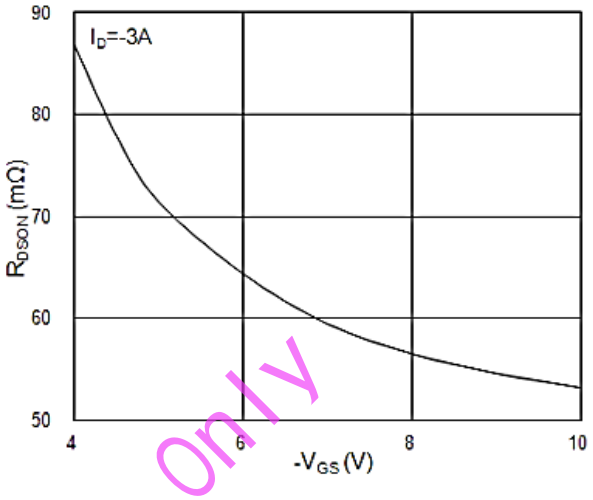

Fig.2 On-Resistance vs. G-S Voltage

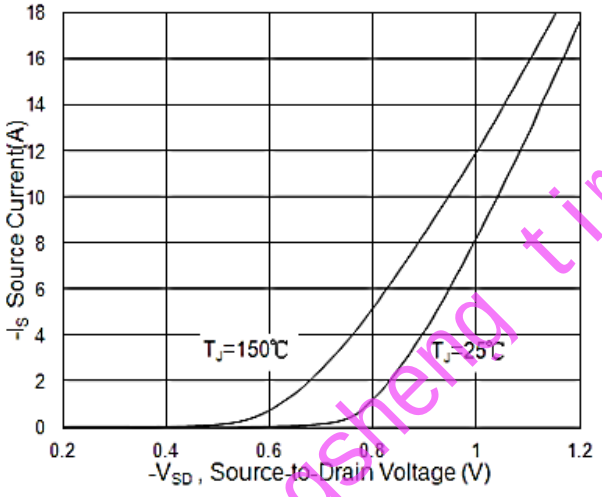

Fig.3 Forward Characteristics Of Reverse

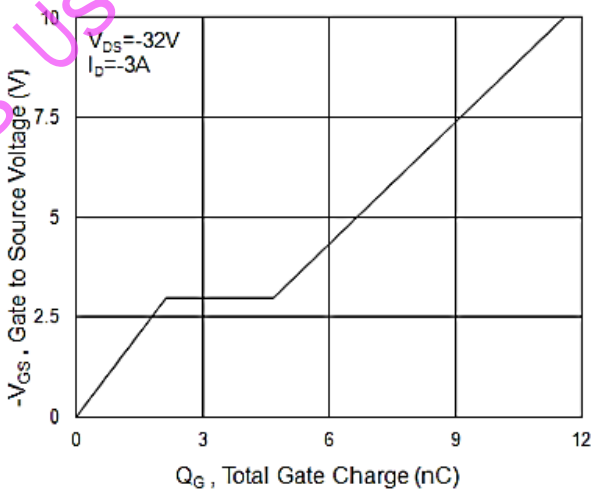

Fig.4 Gate-Charge Characteristics

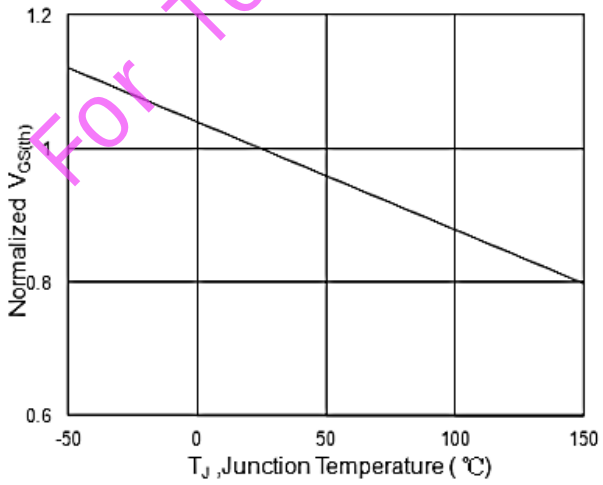

Fig.5 Normalized $V_{GS(th)}$ vs. T_J

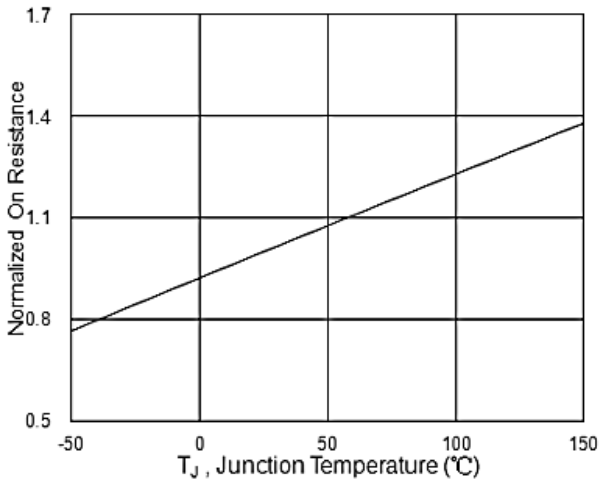

Fig.6 Normalized R_{DSON} vs. T_J

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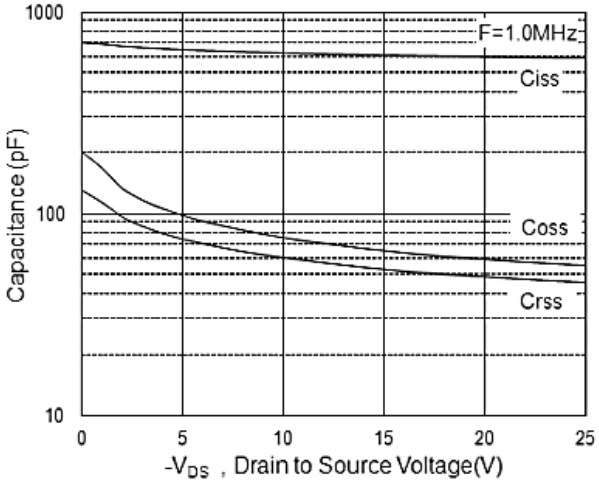

Fig.7 Capacitance

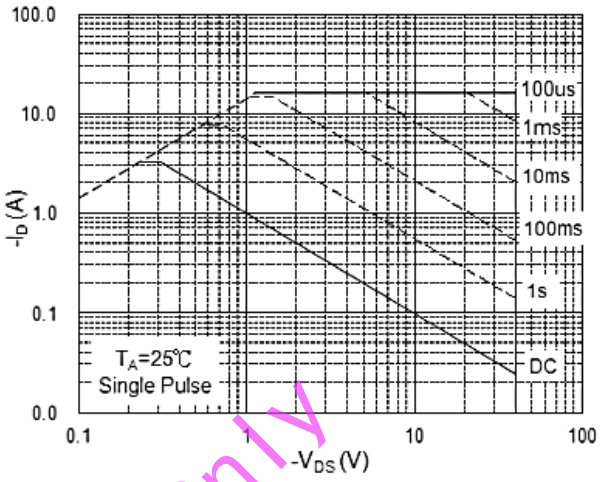

Fig.8 Safe Operating Area

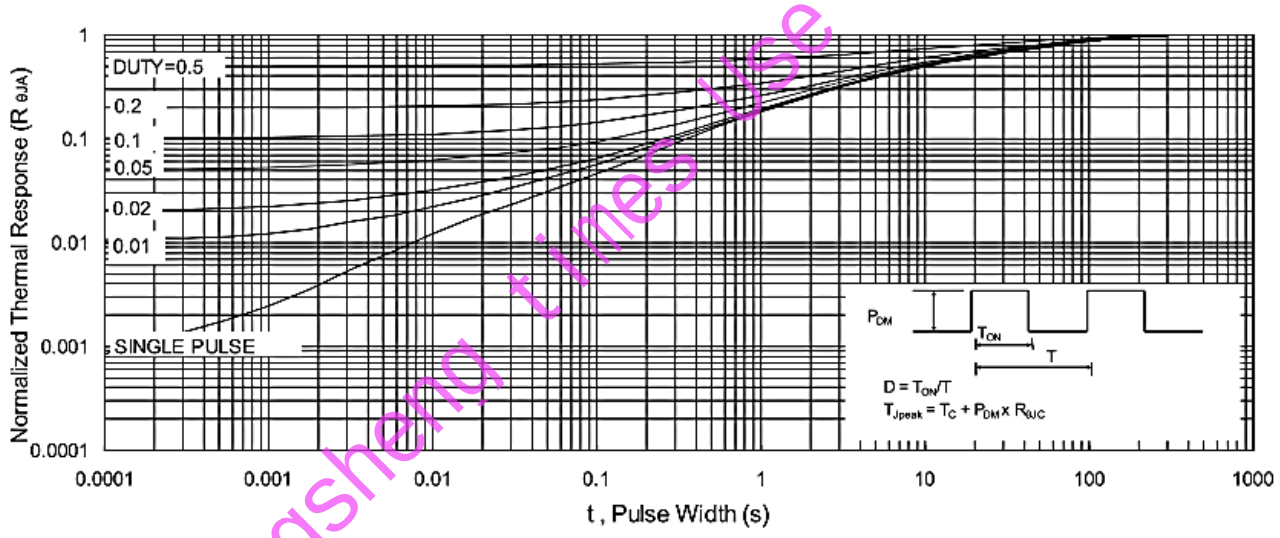

Fig.9 Normalized Maximum Transient Thermal Impedance

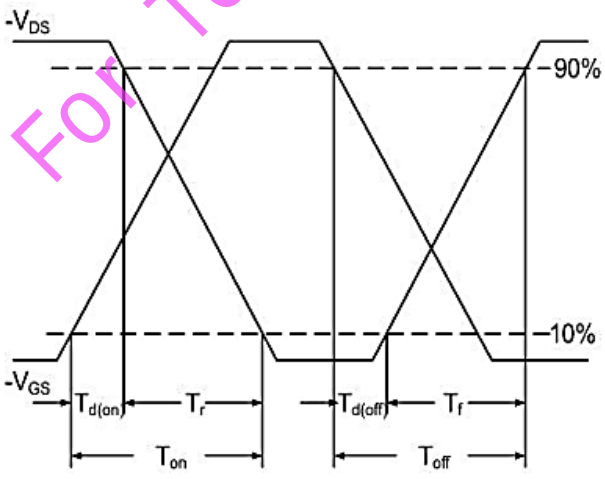

Fig.10 Switching Time Waveform

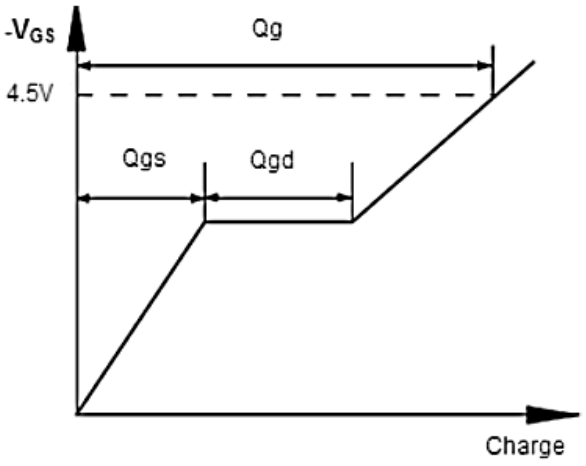

Fig.11 Gate Charge Waveform

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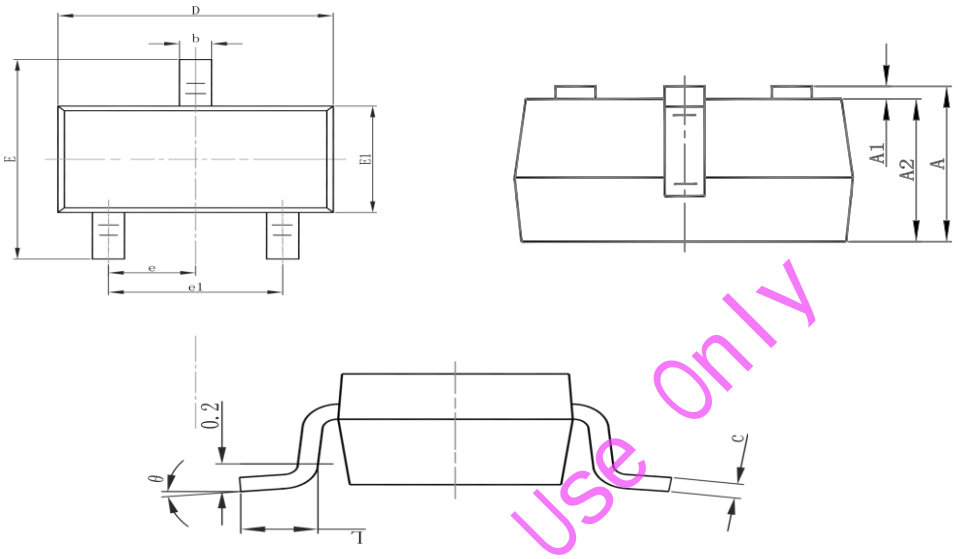
Package Mechanical Data:SOT23-3L



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E1	1.500	1.700	0.059	0.067
E	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

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