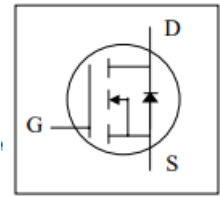


40V N-Channel Enhancement Mode MOSFET

Description

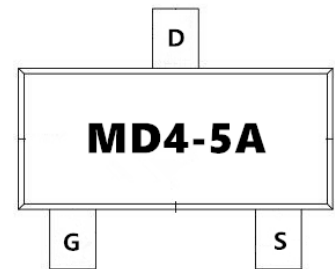
The AP5N04MI uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a Battery protection or in other Switching application.



General Features

$V_{DS} = 40V$ $I_D = 5.0A$

$R_{DS(ON)} < 37m\Omega @ V_{GS}=10V$



Application

- Battery protection
- Load switch
- Uninterruptible power supply



Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
AP5N04MI	SOT-23-3L	MD4-5A	3000

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

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	40	V
V_{GS}	Gate-Source Voltage	± 20	V
$I_D @ T_A=25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	5.0	A
$I_D @ T_A=70^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	3.5	A
I_{DM}	Pulsed Drain Current ²	14	A
$P_D @ T_A=25^\circ C$	Total Power Dissipation ³	1	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	125	°C/W
$R_{\theta JC}$	Thermal Resistance Junction-Case ¹	80	°C/W

40V N-Channel Enhancement Mode MOSFET

Electrical Characteristics (TA=25°C unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250μA	40	---	---	V
ΔBV _{DSS} /ΔT _J	BVDSS Temperature Coefficient	Reference to 25°C, I _D =1mA	---	0.032	---	V/°C
R _{DS(ON)}	Static Drain-Source On-Resistance ²	V _{GS} =10V, I _D =4A	---	30	37	mΩ
		V _{GS} =4.5V, I _D =3A	---	40	50	
V _{GS(th)}	Gate Threshold Voltage		1.0	1.5	2.5	V
ΔV _{GS(th)}	V _{GS(th)} Temperature Coefficient	V _{GS} =V _{DS} , I _D =250μA	---	-4.5	---	mV/°C
I _{DSS}	Drain-Source Leakage Current	V _{DS} =32V, V _{GS} =0V, T _J =25°C	---	---	1	μA
		V _{DS} =32V, V _{GS} =0V, T _J =55°C	---	---	5	
I _{GSS}	Gate-Source Leakage Current	V _{GS} =±20V, V _{DS} =0V	---	---	±100	nA
g _{fs}	Forward Transconductance	V _{DS} =5V, I _D =4A	---	8	---	S
R _g	Gate Resistance	V _{DS} =0V, V _{GS} =0V, f=1MHz	---	2.4	4.8	Ω
Q _g	Total Gate Charge (4.5V)	V _{DS} =15V, V _{GS} =4.5V, I _D =3A	---	5	---	nC
Q _{gs}	Gate-Source Charge		---	1.54	---	
Q _{gd}	Gate-Drain Charge		---	1.84	---	
T _{d(on)}	Turn-On Delay Time	V _{DD} =15V, V _{GS} =10V, R _G =3.3 I _D =1A	---	7.8	---	ns
T _r	Rise Time		---	2.1	---	
T _{d(off)}	Turn-Off Delay Time		---	29	---	
T _f	Fall Time		---	2.1	---	
C _{iss}	Input Capacitance	V _{DS} =15V, V _{GS} =0V, f=1MHz	---	452	---	pF
C _{oss}	Output Capacitance		---	51	---	
C _{rss}	Reverse Transfer Capacitance		---	38	---	
I _S	Continuous Source Current ^{1,4}	V _G =V _D =0V, Force Current	---	---	4.5	A
I _{SM}	Pulsed Source Current ^{2,4}		---	---	14	A
V _{SD}	Diode Forward Voltage ²	V _{GS} =0V, I _S =1A, T _J =25°C	---	---	1.2	V

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 ≤ 300μs, duty cycle ≤ 2%

3. The power dissipation is limited by 150°C 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.

40V N-Channel Enhancement Mode MOSFET

Typical Characteristics

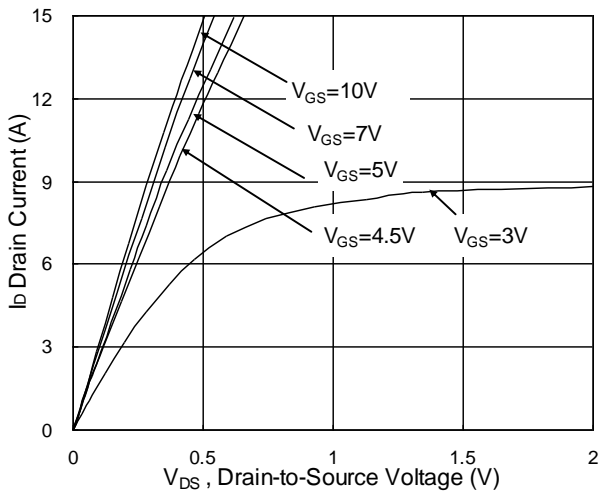


Fig.1 Typical Output Characteristics

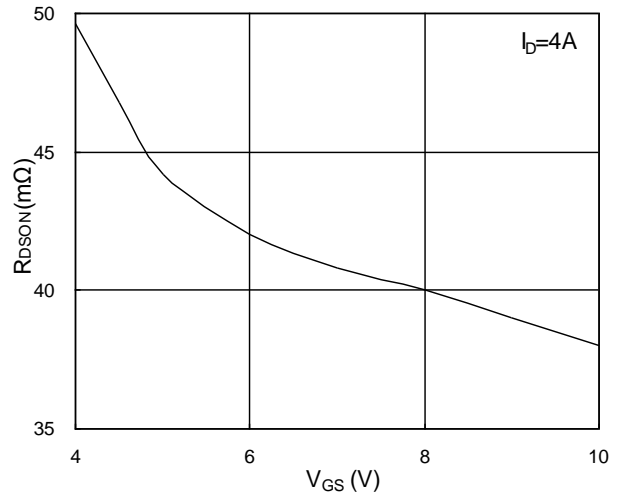


Fig.2 On-Resistance vs. Gate-Source

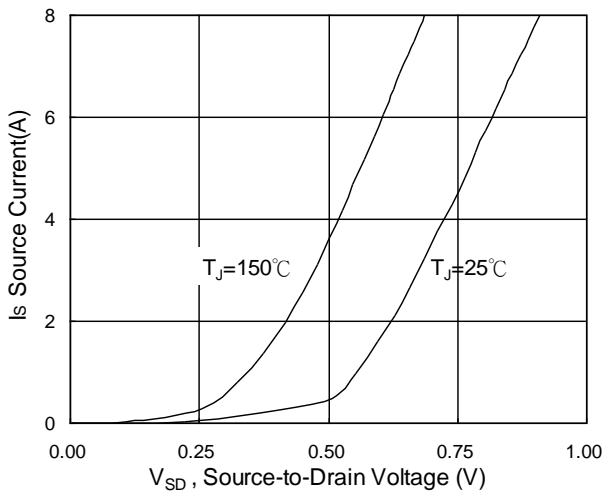


Fig.3 Forward Characteristics Of Reverse

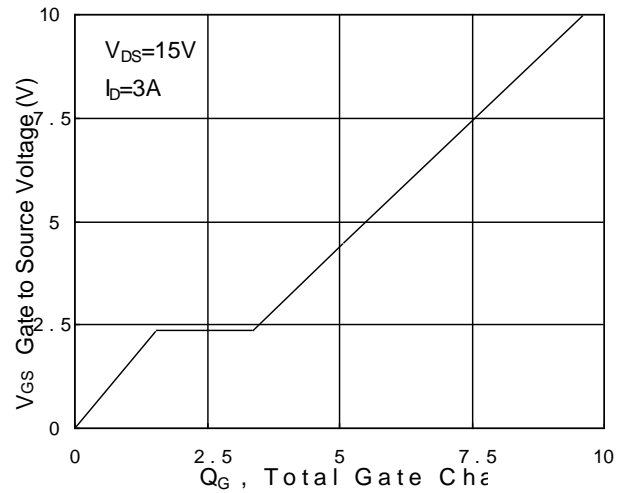


Fig.4 Gate-Charge Characteristics

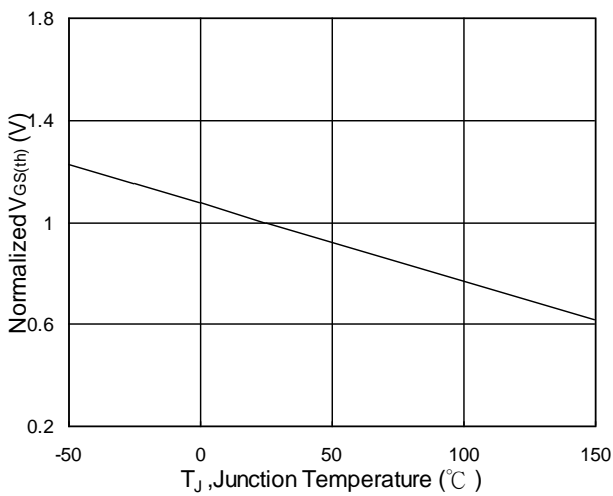


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

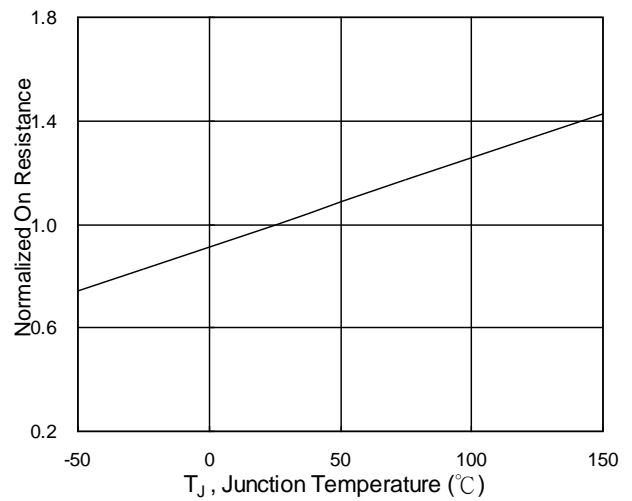


Fig.6 Normalized $R_{DS(on)}$ vs. T_J



40V N-Channel Enhancement Mode MOSFET

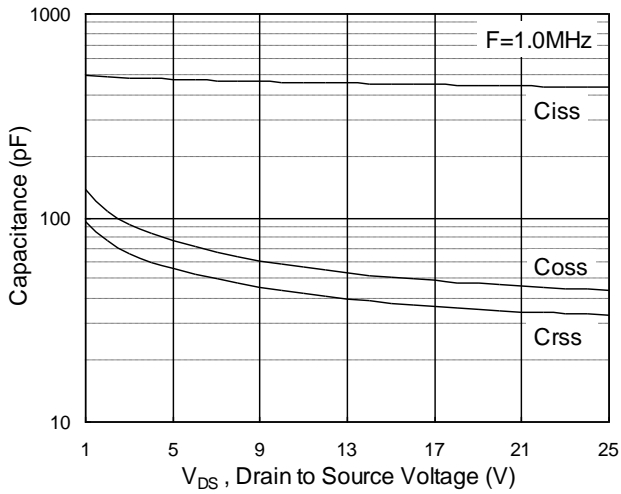


Fig.7 Capacitance

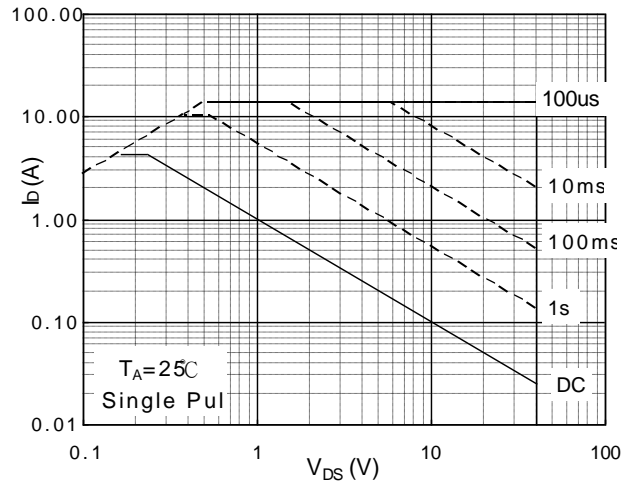


Fig.8 Safe Operating Area

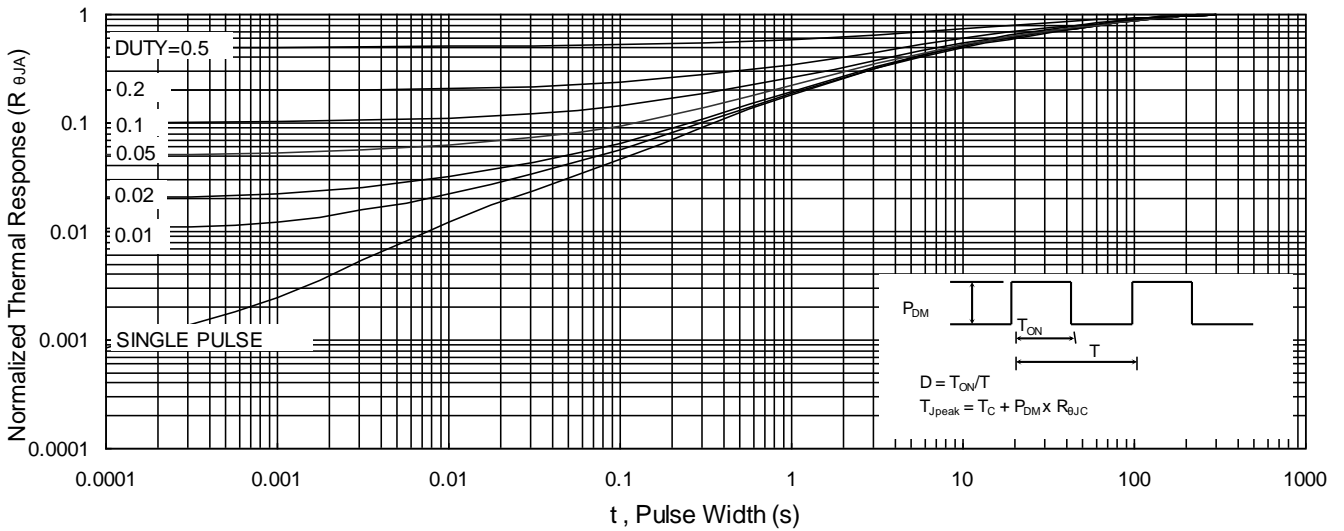


Fig.9 Normalized Maximum Transient Thermal Impedance

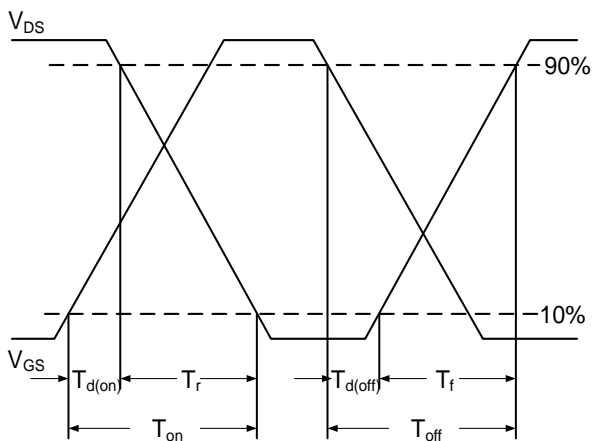


Fig.10 Switching Time Waveform

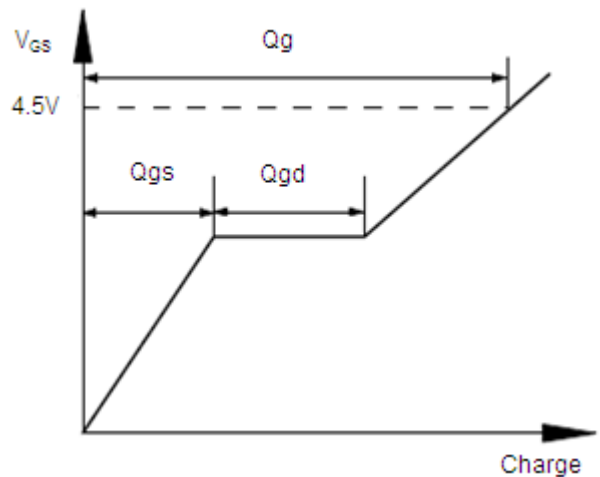
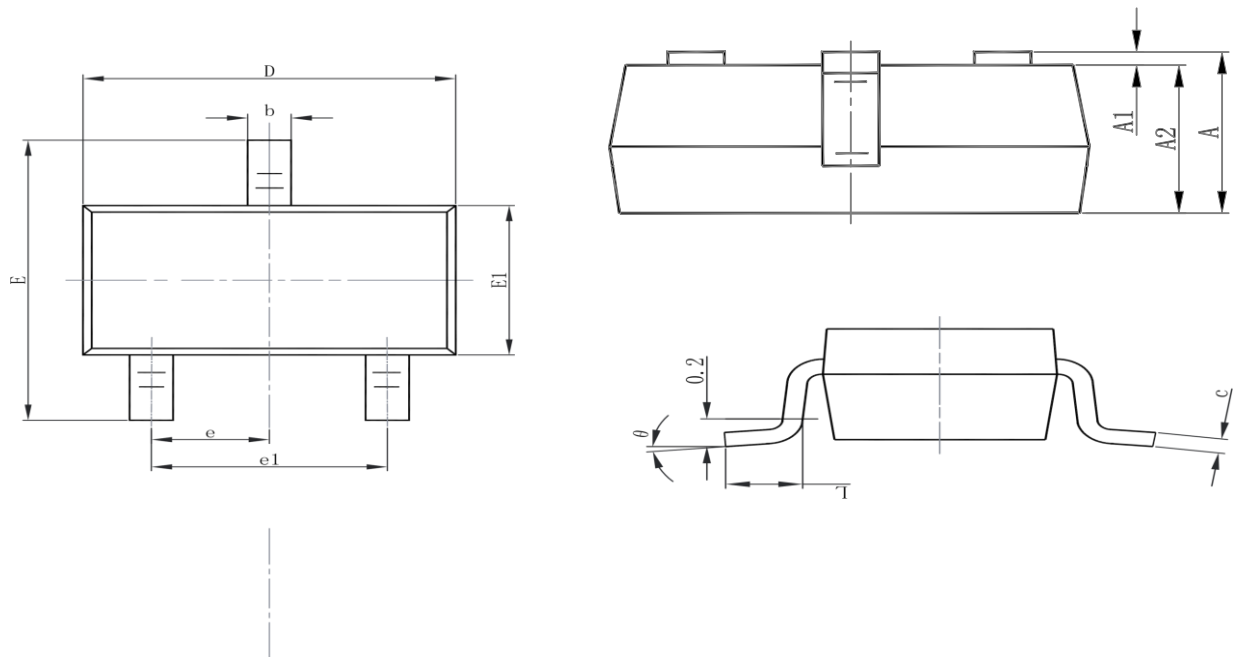


Fig.11 Gate Charge Waveform

40V N-Channel Enhancement Mode MOSFET

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°

40V N-Channel Enhancement Mode MOSFET

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