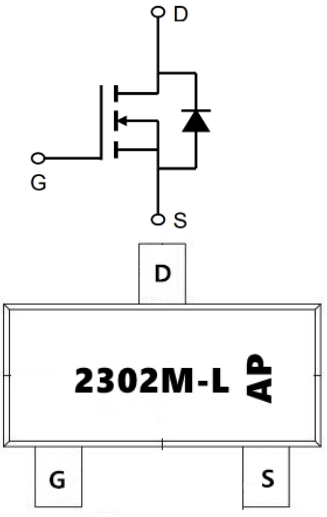
AP2302MI-L

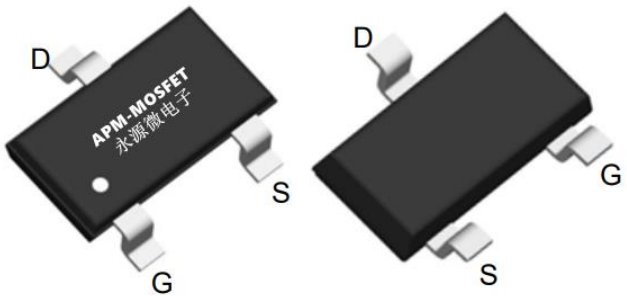
20V N-Channel Enhancement Mode MOSFET

Description

The AP2302MI-L 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.



Top View Bottom View



General Features

V_{DS} = 20V I_D =3.5A

$R_{DS(ON)}$ < 52mΩ @ V_{GS}=10V （**Type：46mΩ**）

Application

Battery protection

Load switch

Uninterruptible power supply

Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
AP2302MI-L	SOT23-3L	2302M-L-AP	3000

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

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	20	V
V_{GS}	Gate-Source Voltage	±12	V
I_D@T_A=25℃	Continuous Drain Current, V_{GS} @ 4.5V[1]	3.5	A
I_D@T_A=70℃	Continuous Drain Current, V_{GS} @ 4.5V[1]	2.3	A
I_{DM}	Pulsed Drain Current[2]	10.6	A
P_D@T_A=25℃	Total Power Dissipation[3]	1	W
T_{STG}	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

Electrical Characteristics (T_J=25℃, unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BVDSS	Drain-Source Breakdown Voltage	V_{GS}=0V , I_D=250uA	20	22	---	V
RDS(ON)	Static Drain-Source On-Resistance[2]	V_{GS}=4.5V , I_D=3A	---	46	52	mΩ
		V_{GS}=2.5V , I_D=2A	---	55	65	
VGS(th)	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =250uA	0.4	0.6	1.2	V
IDSS	Drain-Source Leakage Current	V_{DS}=16V , V_{GS}=0V , T_J=25℃	---	---	1	uA
		V_{DS}=16V , V_{GS}=0V , T_J=55℃	---	---	5	
IGSS	Gate-Source Leakage Current	V_{GS}=±12V , V_{DS}=0V	---	---	±100	nA
gfs	Forward Transconductance	V_{DS}=5V , I_D=3A	---	10.5	---	S
Q_g	Total Gate Charge (4.5V)	V_{DS}=15V , V_{GS}=4.5V , I_D=3A	---	4.6	---	nC
Qgs	Gate-Source Charge		---	0.7	---	
Qgd	Gate-Drain Charge		---	1.5	---	
Td(on)	Turn-On Delay Time	V_{DD}=10V , V_{GS}=4.5V , R_G=3.3Ω I_D=3A	---	1.6	---	ns
T_r	Rise Time		---	42	---	
Td(off)	Turn-Off Delay Time		---	14	---	
T_f	Fall Time		---	7	---	
Ciss	Input Capacitance	V_{DS}=15V , V_{GS}=0V , f=1MHz	---	310	---	pF
Coss	Output Capacitance		---	49	---	
Crss	Reverse Transfer Capacitance		---	35	---	
IS	Continuous Source Current[1,4]	V_G=V_D=0V , Force Current	---	---	3.6	A
VSD	Diode Forward Voltage[2]	V_{GS}=0V , I_S=1A , T_J=25℃	---	---	1.2	V

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 ≦ 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

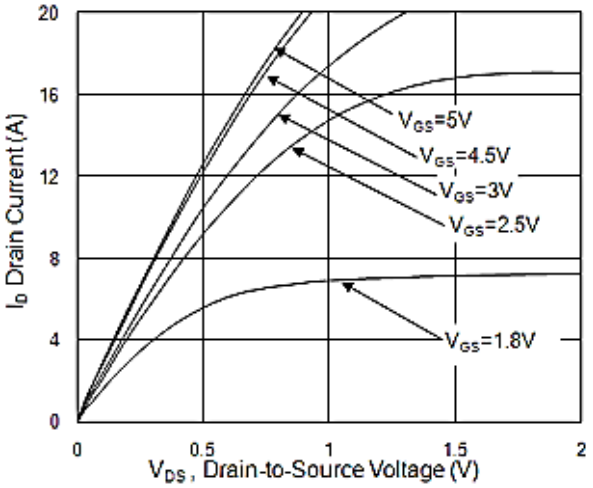


Fig.1 Typical Output Characteristics

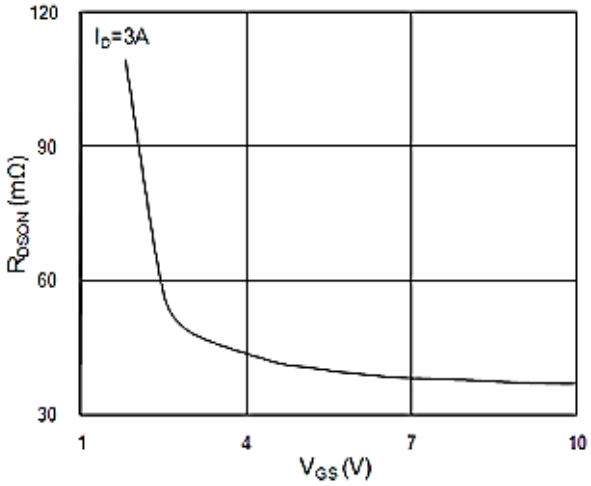
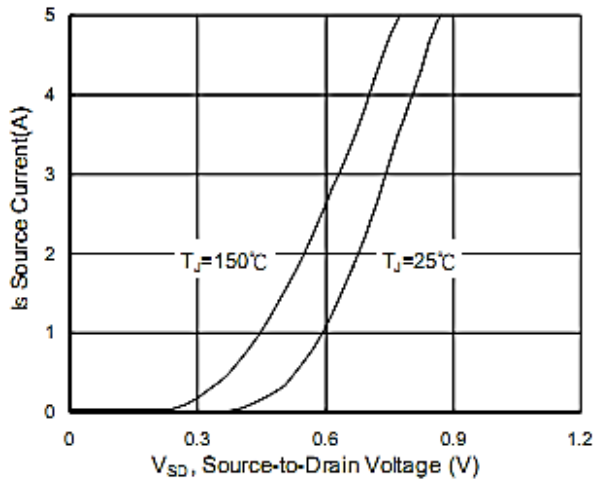
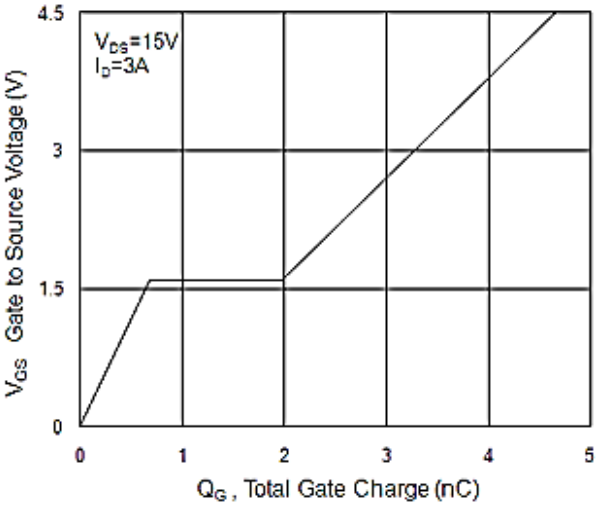


Fig.2 On-Resistance vs. G-S Voltage





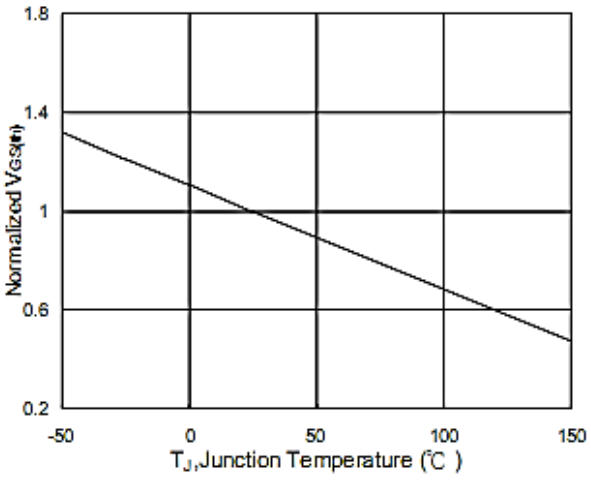


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

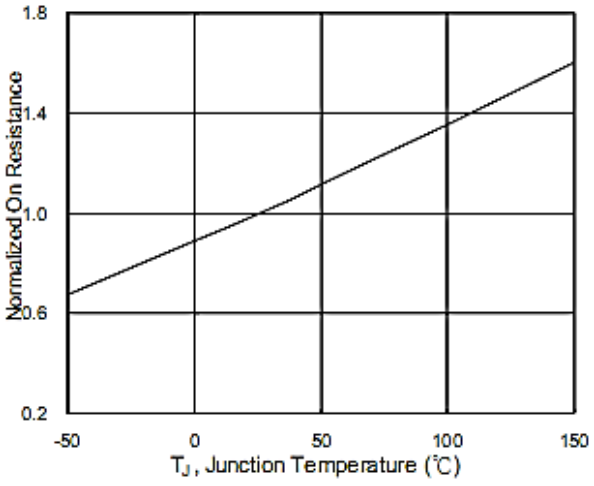


Fig.6 Normalized R_{DSON} vs. T_J

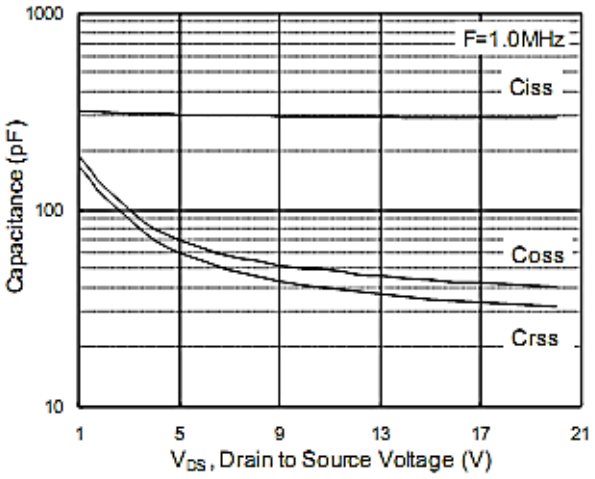


Fig.7 Capacitance

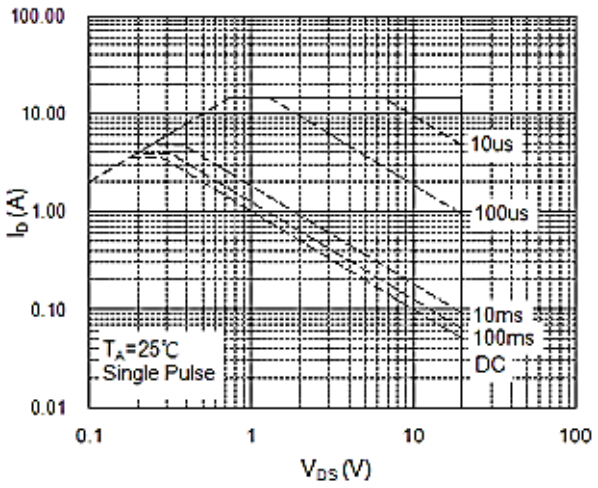


Fig.8 Safe Operating Area

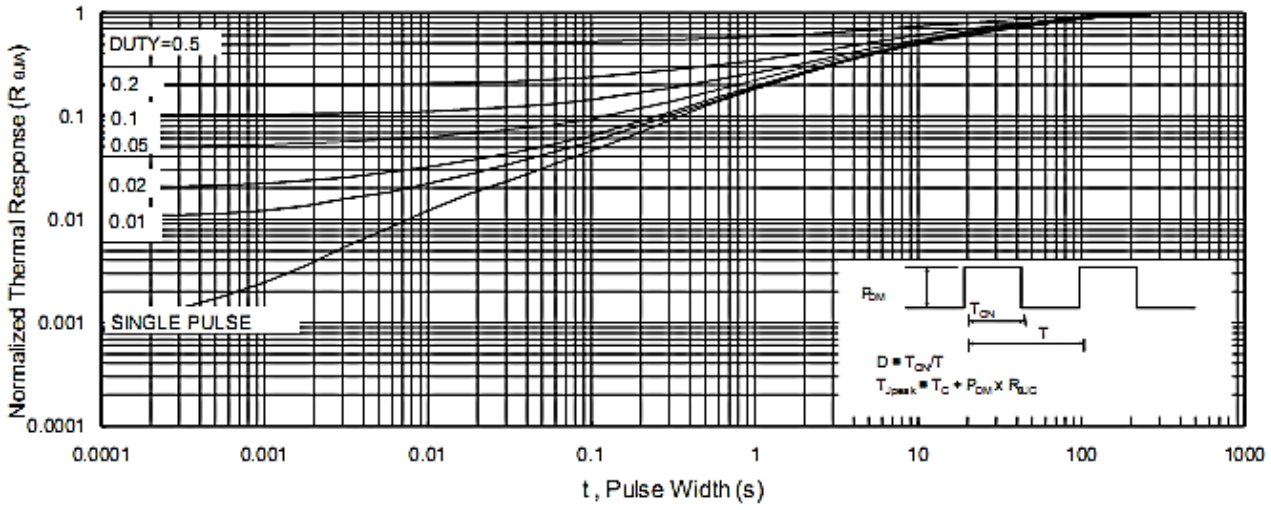


Fig.9 Normalized Maximum Transient Thermal Impedance

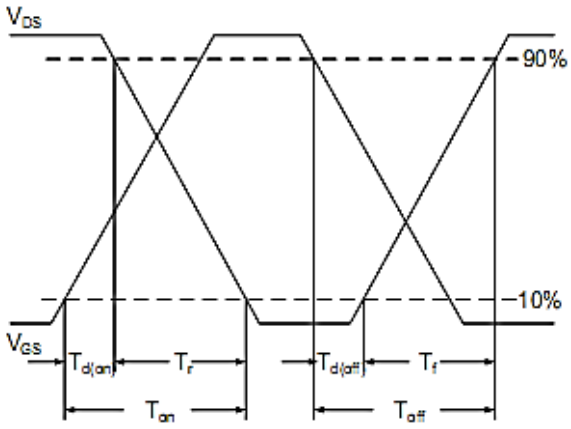


Fig.10 Switching Time Waveform

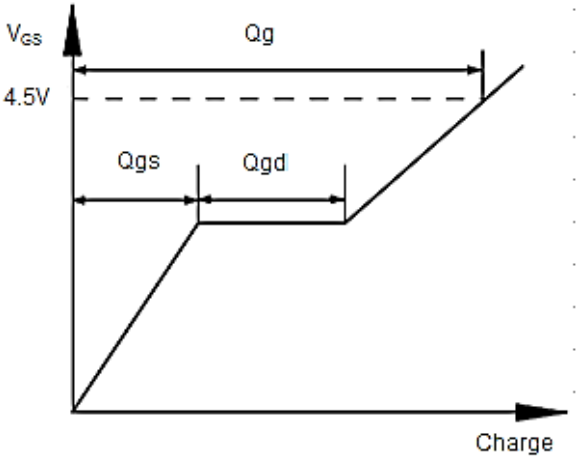
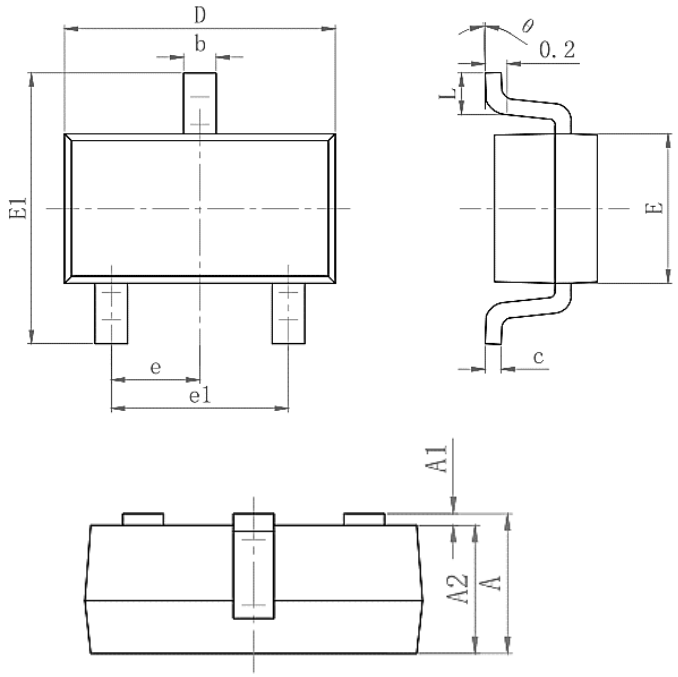


Fig.11 Gate Charge Waveform

Package Mechanical Data-SOT23-3L-Single



Symbol	Dimensions in Millimeters	
	mm	
	Min	Max
A	1.05	1.25
A1	0.000	0.100
A2	1.05	1.15
b	0.25	0.45
c	0.100	0.200
D	2.820	3.020
E	1.500	1.700
E1	2.650	2.950
e	0.950（BSC）	
e1	1.800	2.000
L	0.300	0.500
θ	0°	8°

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20V N-Channel Enhancement Mode MOSFET

Edition	Date	Change
REV1.0	2020/5/1	Initial release