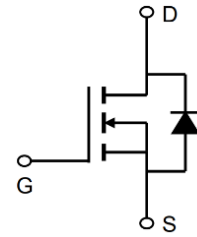


## 30V N-Channel Enhancement Mode MOSFET

### Description

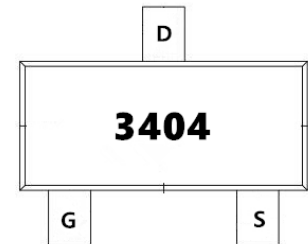
The AP3404MI uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a Battery protection or in other Switching application.



### General Features

$V_{DS} = 30V$   $I_D = 6A$

$R_{DS(ON)} < 25m\Omega$  @  $V_{GS}=10V$



### Application

Lithium battery protection

Wireless impact

Mobile phone fast charging



### Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
AP2313MI	SOT-23-3L	3404	3000

### Absolute Maximum Ratings ( $T_C=25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	30	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D@T_A=25^\circ\text{C}$	Continuous Drain Current	6	A
$I_D@T_A=70^\circ\text{C}$	Continuous Drain Current	4.9	A
$I_{DM}$	Pulsed Drain Current <sup>2</sup>	20	A
$P_D@T_A=25^\circ\text{C}$	Total Power Dissipation <sup>3</sup>	1	W
$T_{STG}$	Storage Temperature Range	-55 to 150	$^\circ\text{C}$
$T_J$	Operating Junction Temperature Range	-55 to 150	$^\circ\text{C}$
$R_{\theta JA}$	Thermal Resistance Junction-ambient <sup>1</sup>	125	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance Junction-Ambient <sup>1</sup> ( $t \leq 10\text{s}$ )	85	$^\circ\text{C}/\text{W}$

## 30V N-Channel Enhancement Mode MOSFET

### Electrical Characteristics (T<sub>c</sub>=25°C unless otherwise noted)

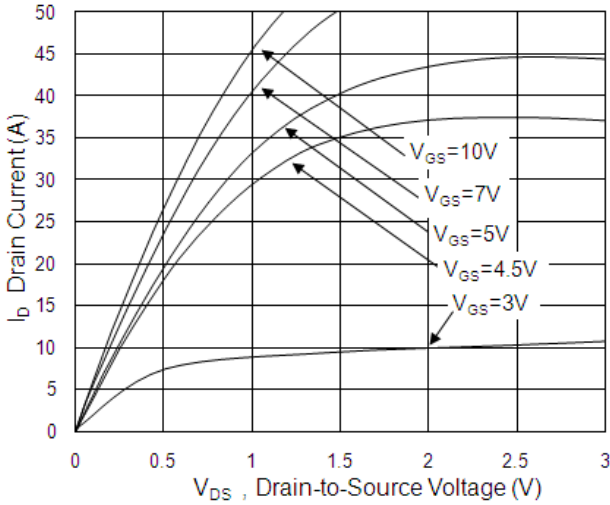
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BVDSS	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =250uA	30	32	---	V
ΔBVDSS/ΔT <sub>J</sub>	BVDSS Temperature Coefficient	Reference to 25°C, I <sub>D</sub> =1mA	---	0.029	---	V/°C
RDS(ON)	Static Drain-Source On-Resistance <sup>2</sup>	V <sub>GS</sub> =10V, I <sub>D</sub> =5.8A	---	20	25	mΩ
RDS(ON)	Static Drain-Source On-Resistance <sup>2</sup>	V <sub>GS</sub> =4.5V, I <sub>D</sub> =5A	---	28	32	
VGS(th)	Gate Threshold Voltage	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250uA	1.2	1.6	2.5	V
ΔVGS(th)	V <sub>GS(th)</sub> Temperature Coefficient		---	-2.82	---	mV/°C
IDSS	Drain-Source Leakage Current	V <sub>DS</sub> =24V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C	---	---	1	uA
		V <sub>DS</sub> =24V, V <sub>GS</sub> =0V, T <sub>J</sub> =55°C	---	---	5	
IGSS	Gate-Source Leakage Current	V <sub>GS</sub> =±12V, V <sub>DS</sub> =0V	---	---	±100	nA
gfs	Forward Transconductance	V <sub>DS</sub> =5V, I <sub>D</sub> =5A	---	25	---	S
R <sub>g</sub>	Gate Resistance	V <sub>DS</sub> =0V, V <sub>GS</sub> =0V, f=1MHz	---	1.5	---	Ω
Q <sub>g</sub>	Total Gate Charge (4.5V)	V <sub>DS</sub> =15V, V <sub>GS</sub> =4.5V, I <sub>D</sub> =5.8A	---	11.5	---	nC
Q <sub>gs</sub>	Gate-Source Charge		---	1.6	---	
Q <sub>gd</sub>	Gate-Drain Charge		---	2.9	---	
Td(on)	Turn-On Delay Time	V <sub>DD</sub> =15V, V <sub>GS</sub> =10V, R <sub>G</sub> =3Ω I <sub>D</sub> =5A	---	5	---	ns
T <sub>r</sub>	Rise Time		---	47.	---	
Td(off)	Turn-Off Delay Time		---	26	---	
T <sub>f</sub>	Fall Time		---	8	---	
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =15V, V <sub>GS</sub> =0V, f=1MHz	---	860	---	pF
C <sub>oss</sub>	Output Capacitance		---	84	---	
Crss	Reverse Transfer Capacitance		---	70	---	
I <sub>s</sub>	Continuous Source Current <sup>1,4</sup>	V <sub>G</sub> =V <sub>D</sub> =0V, Force Current	---	---	5.8	A
V <sub>SD</sub>	Diode Forward Voltage <sup>2</sup>	V <sub>GS</sub> =0V, I <sub>s</sub> =1A, T <sub>J</sub> =25°C	---	---	1.2	V

Note :

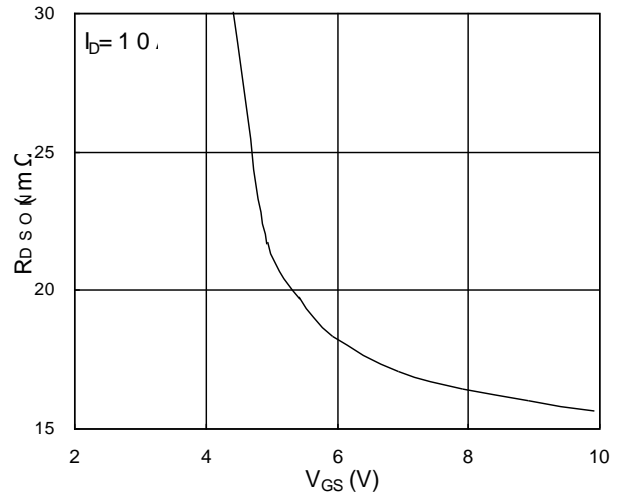
1. The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper.
2. The data tested by pulsed, pulse width ≅ 300us, duty cycle ≅ 2%
3. The power dissipation is limited by 150°C junction temperature
4. The data is theoretically the same as I<sub>D</sub> and I<sub>DM</sub>, in real applications, should be limited by total power dissipation.

**30V N-Channel Enhancement Mode MOSFET**

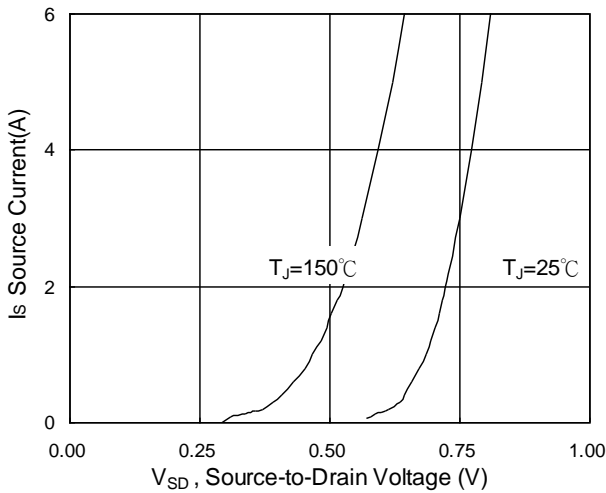
**Typical Characteristics**



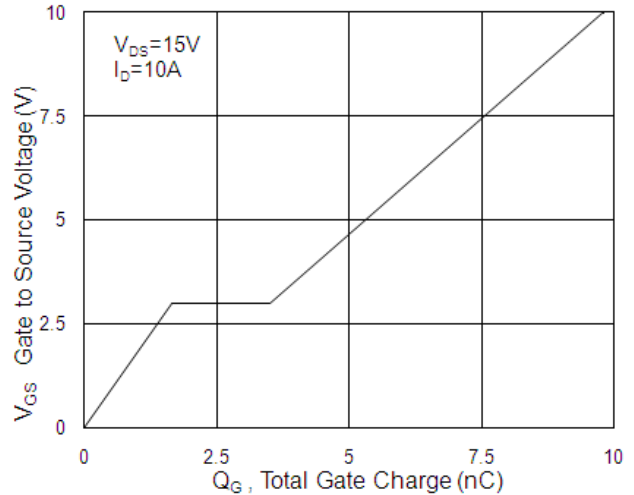
**Fig.1 Typical Output Characteristics**



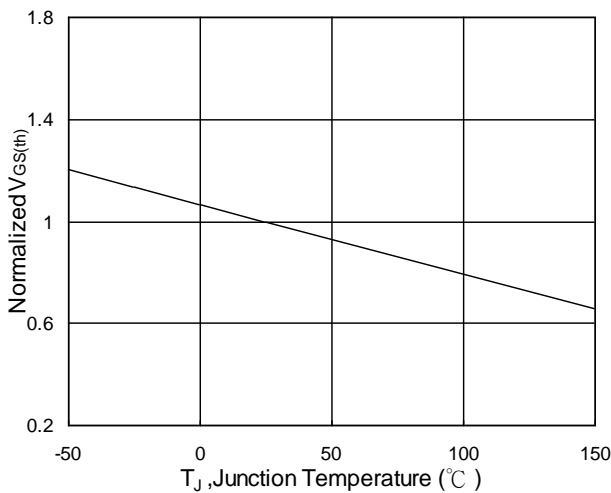
**Fig.2 On-Resistance vs. Gate-Source**



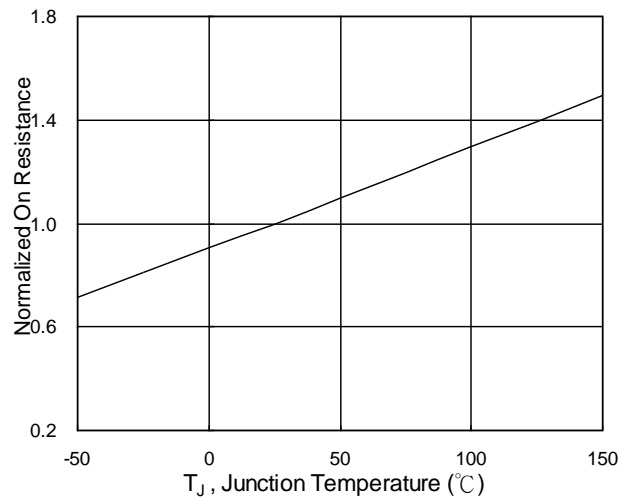
**Fig.3 Forward Characteristics Of Reverse**



**Fig.4 Gate-Charge Characteristics**



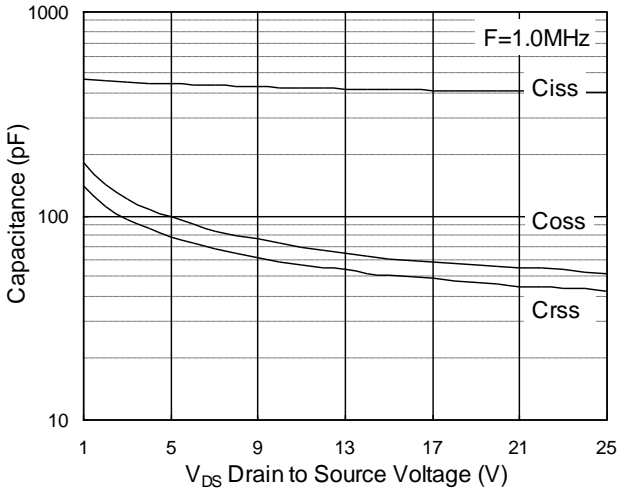
**Fig.5 Normalized  $V_{GS(th)}$  vs.  $T_J$**



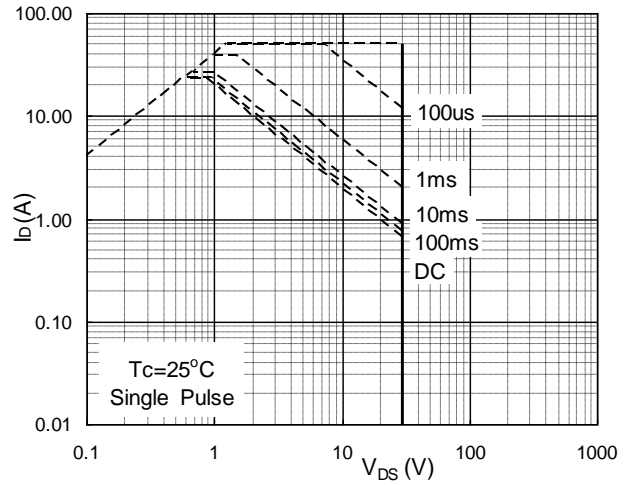
**Fig.6 Normalized  $R_{DS(on)}$  vs.  $T_J$**



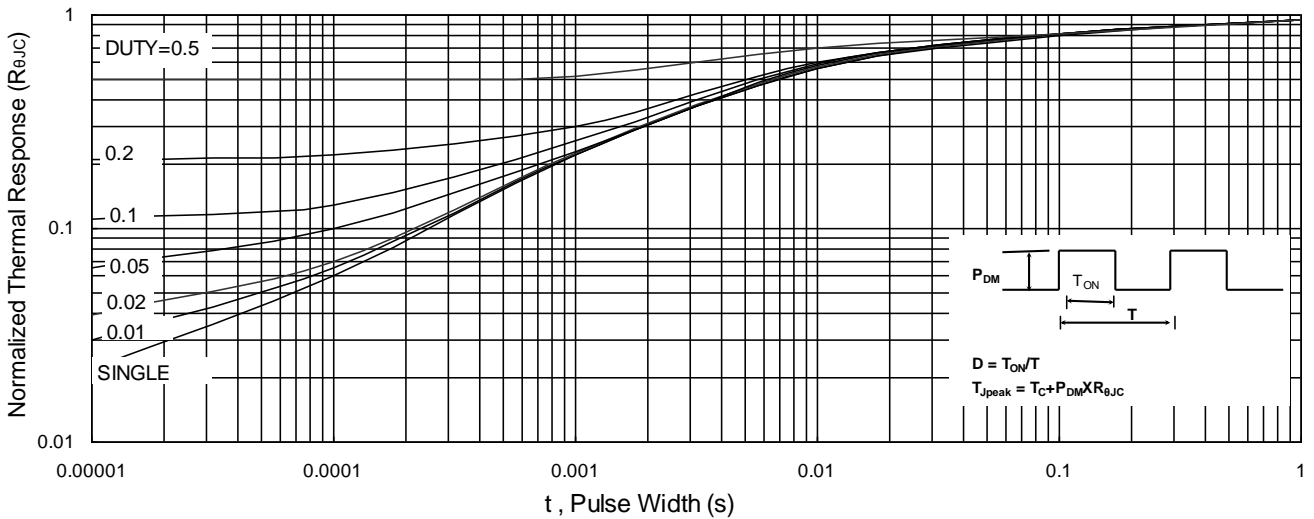
**30V N-Channel Enhancement Mode MOSFET**



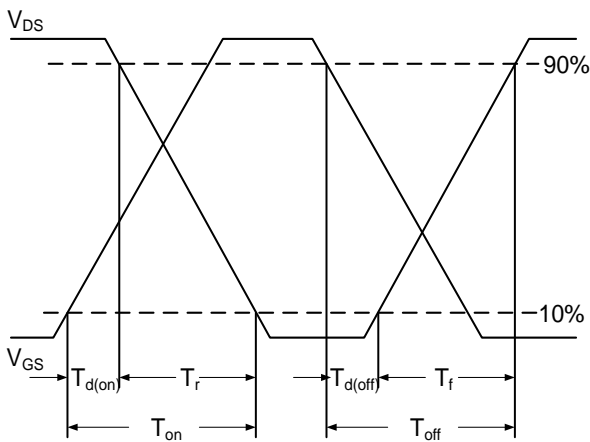
**Fig.7 Capacitance**



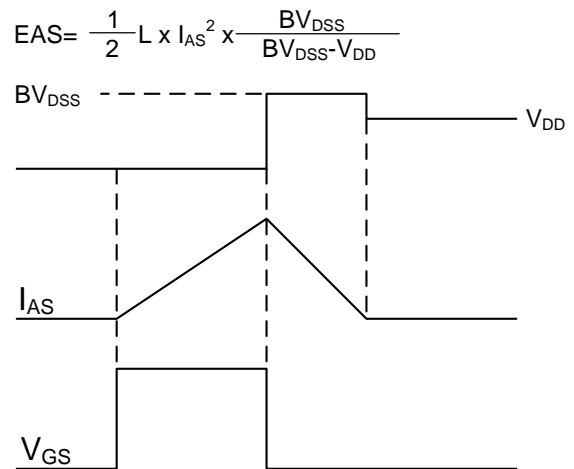
**Fig.8 Safe Operating Area**



**Fig.9 Normalized Maximum Transient Thermal Impedance**

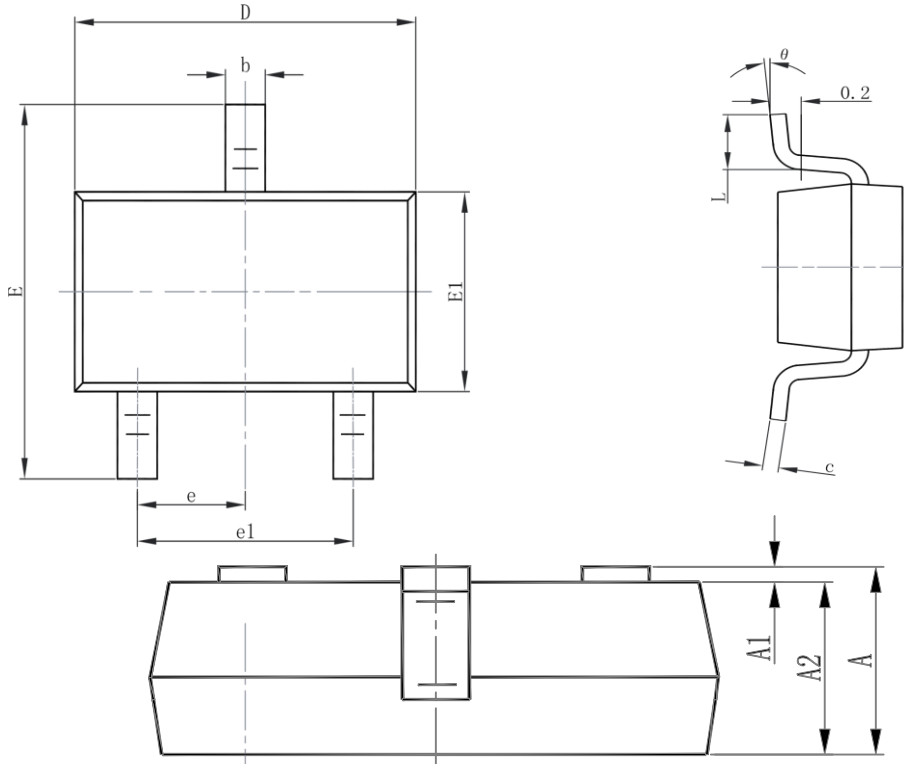


**Fig.10 Switching Time Waveform**



**Fig.11 Unclamped Inductive Switching Waveform**

### Package Mechanical Data-SOT23-3



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
$\theta$	0°	8°	0°	8°

**30V N-Channel Enhancement Mode MOSFET  
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Edition	Date	Change
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