

## 30V N-Channel Enhancement Mode MOSFET

### Description

The AP3404BI 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

$V_{DS} = 30V$   $I_D = 6.2A$

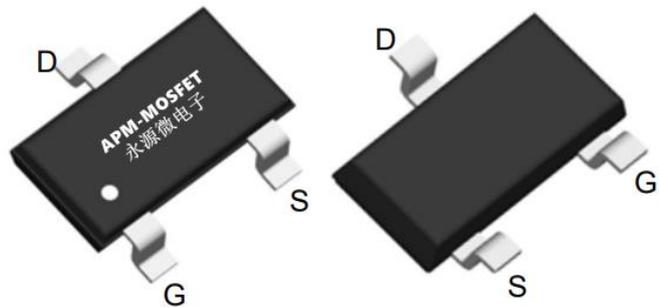
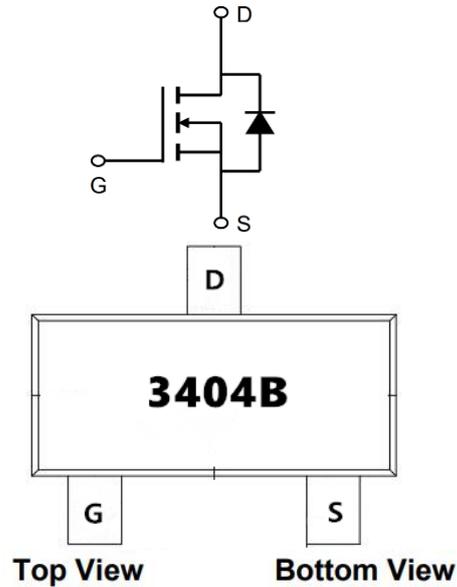
$R_{DS(ON)} < 25m\Omega$  @  $V_{GS}=10V$  (Type: 19m $\Omega$ )

### Application

Lithium battery protection

Wireless impact

Mobile phone fast charging



### Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
AP3404BI	SOT23L	3404B	3000

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

Symbol	Parameter	Rating	Units
V <sub>DS</sub>	Drain-Source Voltage	30	V
V <sub>GS</sub>	Gate-Source Voltage	±20	V
$I_D@T_A=25^\circ\text{C}$	Continuous Drain Current	6.2	A
$I_D@T_A=70^\circ\text{C}$	Continuous Drain Current	4.1	A
IDM	Pulsed Drain Current <sup>2</sup>	20	A
$P_D@T_A=25^\circ\text{C}$	Total Power Dissipation <sup>3</sup>	1.25	W
TSTG	Storage Temperature Range	-55 to 150	°C
T <sub>J</sub>	Operating Junction Temperature Range	-55 to 150	°C
R <sub>θJA</sub>	Thermal Resistance Junction-ambient <sup>1</sup>	125	°C/W
R <sub>θJA</sub>	Thermal Resistance Junction-Ambient <sup>1</sup> (t ≤ 10s)	85	°C/W

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### Electrical Characteristics ( $T_C=25^{\circ}\text{C}$ unless otherwise noted)

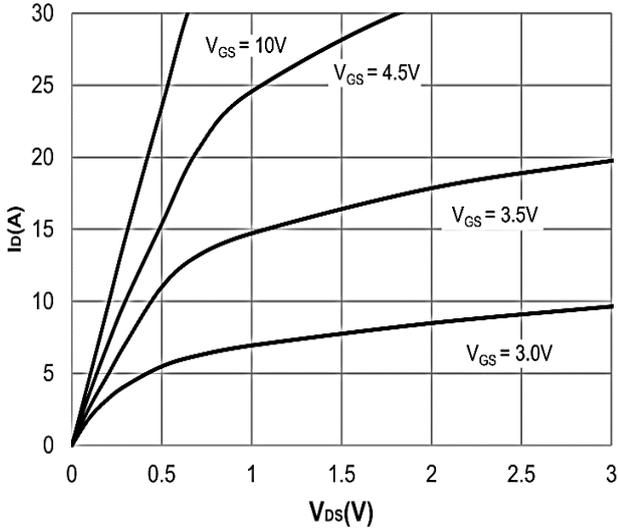
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V(BR)DSS	Drain-Source Breakdown Voltage	$I_D = 250\mu\text{A}, V_{GS} = 0\text{V}$	30	33	-	V
IDSS	Zero Gate Voltage Drain Current	$V_{DS} = 30\text{V}, V_{GS} = 0\text{V}$	-	-	1.0	$\mu\text{A}$
IGSS	Gate-Body Leakage Current	$V_{DS} = 0\text{V}, V_{GS} = \pm 20\text{V}$	-	-	$\pm 100$	nA
VGS(th)	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$	1.2	1.6	2.5	V
RDS(ON)	Static Drain-Source ON-Resistance	$V_{GS} = 10\text{V}, I_D = 4\text{A}$	-	19	25	m $\Omega$
		$V_{GS} = 4.5\text{V}, I_D = 3\text{A}$	-	27	35	m $\Omega$
Ciss	Input Capacitance	$V_{GS}=0\text{V}, V_{DS}=15\text{V}, f=1\text{MHz}$	-	388	-	pF
Coss	Output Capacitance		-	57	-	pF
Crss	Reverse Transfer Capacitance		-	45	-	pF
Qg	Total Gate Charge	$V_{GS}=0 \text{ to } 10\text{V}, V_{DS}=15\text{V}, I_D=3\text{A}$	-	9	-	nC
Qgs	Gate Source Charge		-	1.5	-	nC
Qgd	Gate Drain("Miller") Charge		-	2	-	nC
td(on)	Turn-On DelayTime	$V_{GS}=10\text{V}, V_{DD}=15\text{V}, I_D=3\text{A}, R_{GEN}=3\Omega$	-	2	-	ns
tr	Turn-On Rise Time		-	6	-	ns
td(off)	Turn-Off DelayTime		-	61	-	ns
tr	Turn-Off Fall Time		-	34	-	ns
IS	Maximum Continuous Drain to Source Diode Forward Current		-	-	5	A
ISM	Maximum Pulsed Drain to Source Diode Forward Current		-	-	20	A
VSD	Drain to Source Diode Forward Voltage	$V_{GS} = 0\text{V}, I_S = 5\text{A}$	-	-	1.2	V
trr	Body Diode Reverse Recovery Time	$I_F = 3\text{A}, di/dt = 100\text{A/us}$	-	6	-	ns
Qrr	Body Diode Reverse Recovery Charge		-	2	-	nC

**Note :**

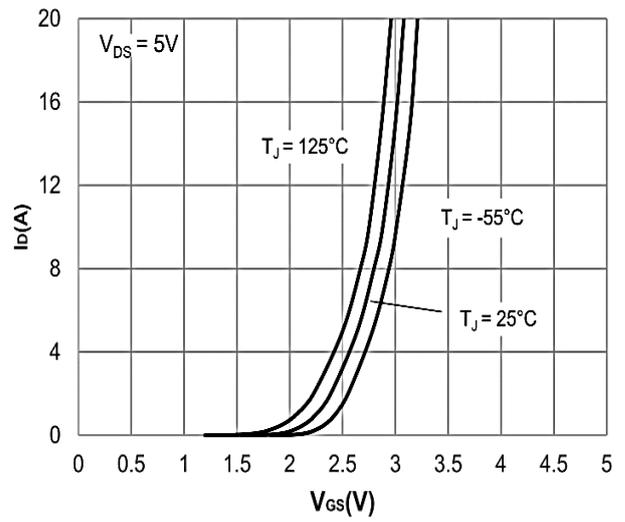
- 1、 The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper.
- 2、 The data tested by pulsed , pulse width  $\leq 300\mu\text{s}$  , duty cycle  $\leq 2\%$
- 3、 The power dissipation is limited by 150 $^{\circ}\text{C}$  junction temperature
- 4、 The data is theoretically the same as  $I_D$  and  $I_{DM}$  , in real applications , should be limited by total power dissipation.

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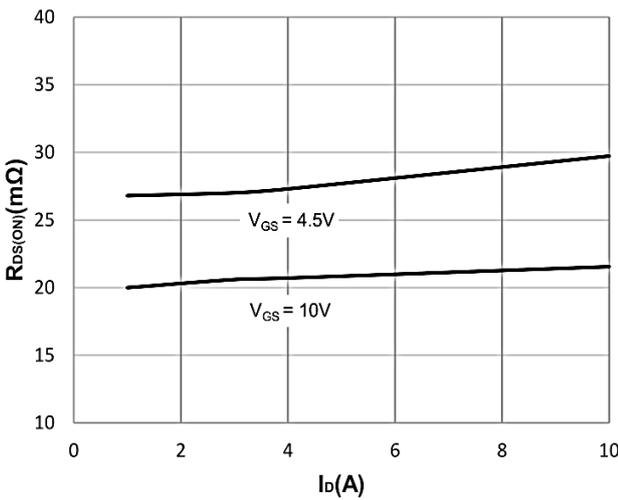
**Typical Characteristics**



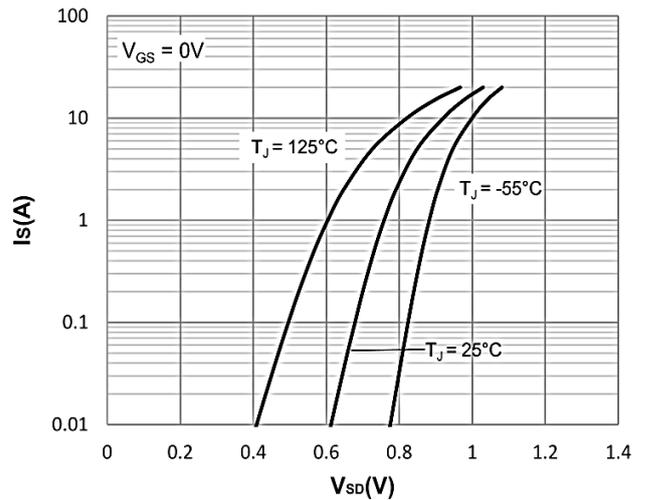
**Figure 1: Output Characteristics**



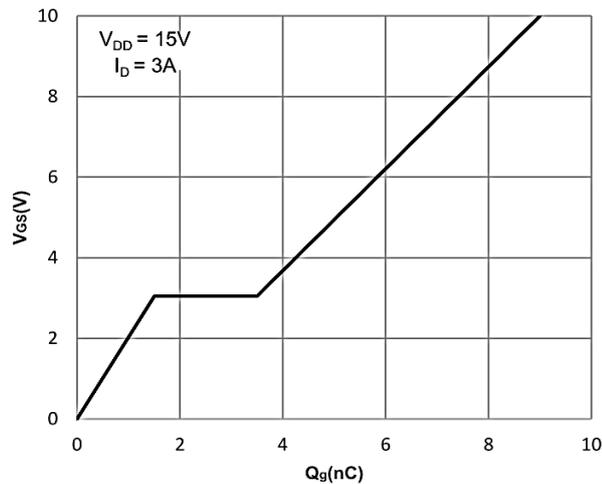
**Figure 2: Typical Transfer Characteristics**



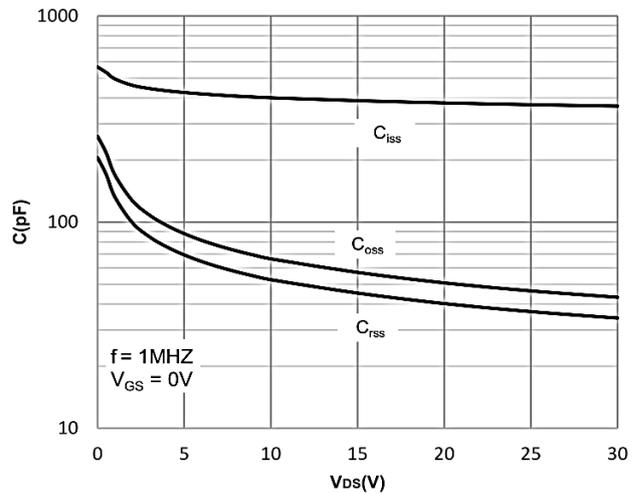
**Figure 3: On-resistance vs. Drain Current**



**Figure 4: Body Diode Characteristics**



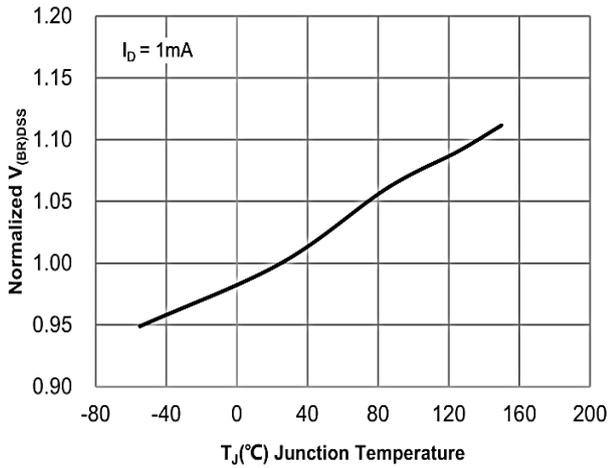
**Figure 5: Gate Charge Characteristics**



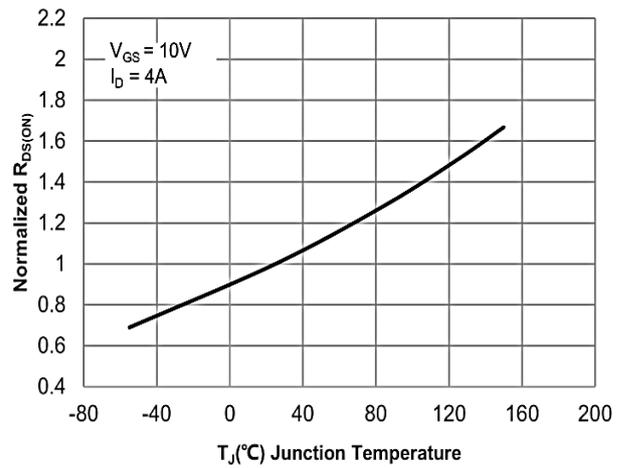
**Figure 6: Capacitance Characteristics**



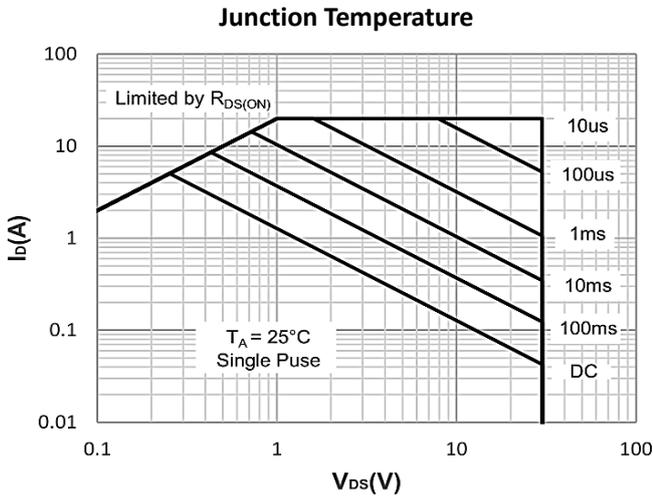
**30V N-Channel Enhancement Mode MOSFET**



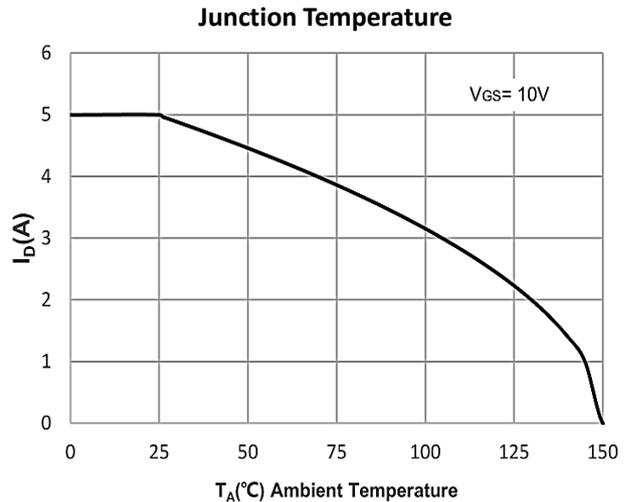
**Figure 7: Normalized Breakdown voltage vs. Junction Temperature**



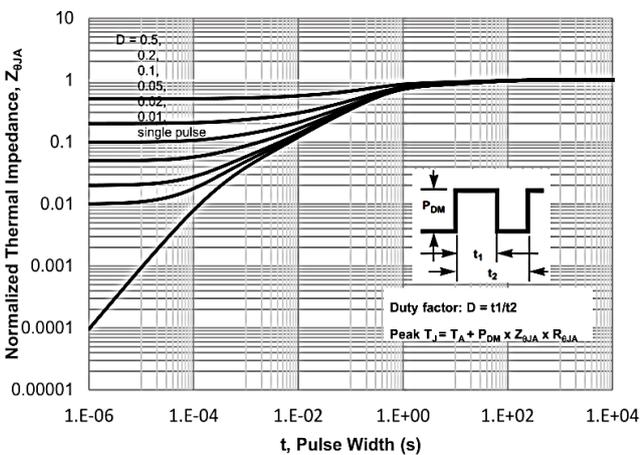
**Figure 8: Normalized on Resistance vs. Junction Temperature**



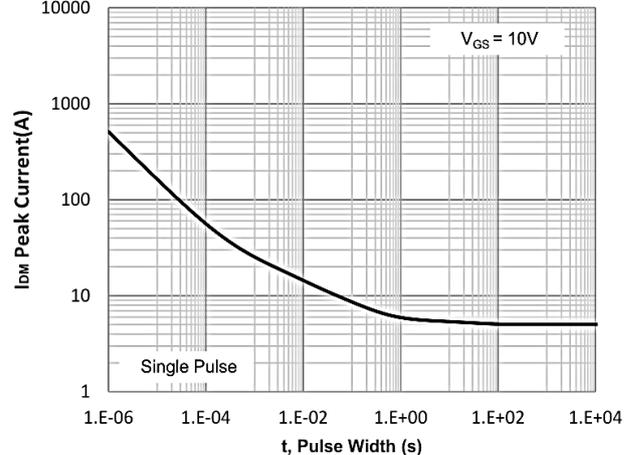
**Figure 9: Maximum Safe Operating Area**



**Figure 10: Maximum Continuous Driain Current vs. Case Temperature**

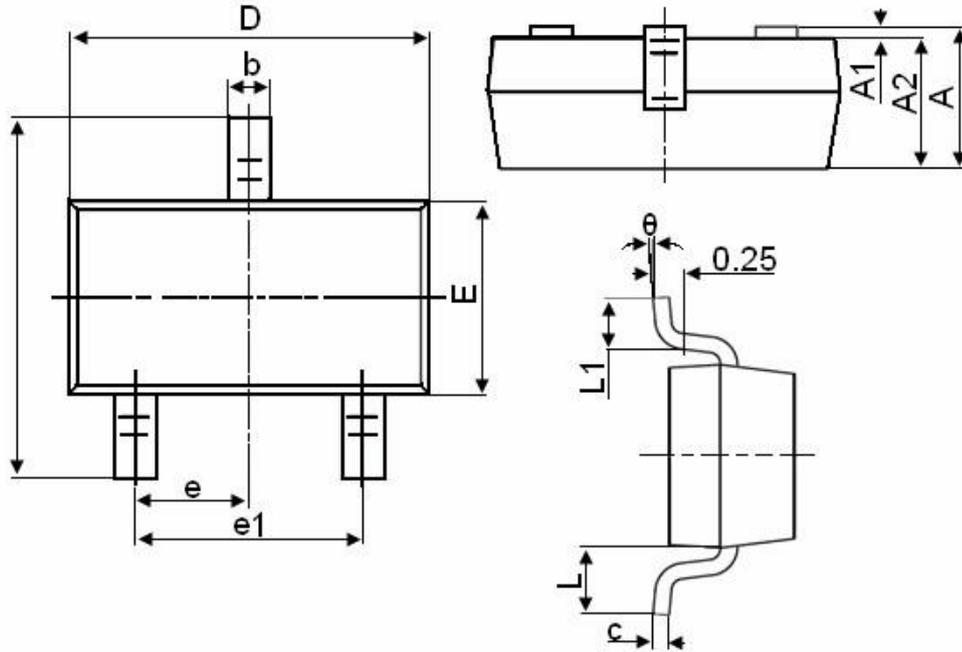


**Figure 11: Normalized Maximum Transient Thermal Impedance**



**Figure 12: Peak Current Capacity**

### Package Mechanical Data-SOT23-XC-Single



Symbol	Dimensions in Millimeters	
	MIN.	MAX.
A	0.900	1.150
A1	0.000	0.100
A2	0.900	1.050
b	0.300	0.500
c	0.080	0.150
D	2.800	3.000
E	1.200	1.400
E1	2.250	2.550
e	0.950TYP	
e1	1.800	2.000
L	0.550REF	
L1	0.300	0.500
$\theta$	0°	8°

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<b>Edition</b>	<b>Date</b>	<b>Change</b>
REV1.0	2020/5/1	Initial release
REV1.1	2023/8/31	Reduce R <sub>dson</sub>

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