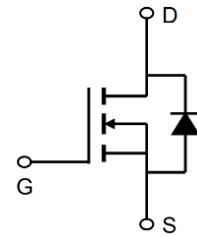


## 20V N-Channel Enhancement Mode MOSFET

### Description

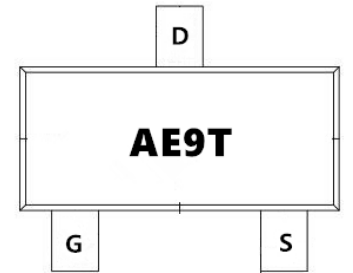
The AP2312AI uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a Battery protection or in other Switching application.



### General Features

$V_{DS} = 20V$   $I_D = 6.8A$

$R_{DS(ON)} < 21m\Omega @ V_{GS}=4.5V$



### Application

- Lithium battery protection
- Wireless impact
- Mobile phone fast charging



### Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
AP2312AI	SOT-23	AE9T	3000

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

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	20	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D @ T_A=25^\circ\text{C}$	Continuous Drain Current	6.8	A
$I_D @ T_A=70^\circ\text{C}$	Continuous Drain Current	6.0	A
$I_{DM}$	Pulsed Drain Current <sup>2</sup>	30	A
$P_D @ T_A=25^\circ\text{C}$	Total Power Dissipation <sup>3</sup>	1.5	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>	83	$^\circ\text{C}/\text{W}$



## 20V N-Channel Enhancement Mode MOSFET

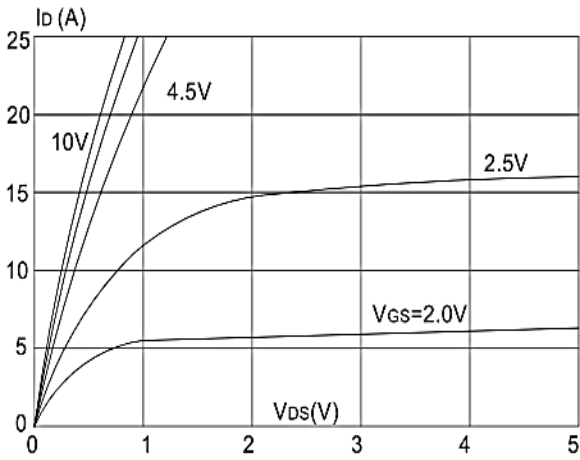
### Electrical Characteristics (T<sub>c</sub>=25°C unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
BVDSS	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	20	22		V
VGS(th)	Gate Threshold Voltage	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> =250μA	0.50	0.65	1.0	V
RDS(ON)	Static Drain-Source On-Resistance	V <sub>GS</sub> =4.5V, I <sub>D</sub> =4A		16	21	mΩ
RDS(ON)	Static Drain-Source On-Resistance	V <sub>GS</sub> =2.5V, I <sub>D</sub> =3A		20	30	
IDSS	Zero Gate Voltage Drain Current	V <sub>DS</sub> =20V, V <sub>GS</sub> =0V			1	μA
IGSS	Gate-Body Leakage Current	V <sub>GS</sub> =±10V, V <sub>DS</sub> =0V			±100	nA
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =10V, V <sub>GS</sub> =0V, f=1MHZ		780		pF
C <sub>oss</sub>	Output Capacitance			140		
C <sub>rss</sub>	Reverse Transfer Capacitance			80		
Q <sub>g</sub>	Total Gate Charge	V <sub>GS</sub> =4.5V, V <sub>DS</sub> =10V, I <sub>D</sub> =6.8A		11		nC
Q <sub>gs</sub>	Gate-Source Charge			2.3		
Q <sub>gd</sub>	Gate-Drain Charge			2.9		
tD(on)	Turn-on Delay Time	V <sub>GS</sub> =4.5V, V <sub>DS</sub> =10V, I <sub>D</sub> =6.8A R <sub>GEN</sub> =3Ω		9		ns
t <sub>r</sub>	Turn-on Rise Time			30		
tD(off)	Turn-off Delay Time			35		
t <sub>f</sub>	Turn-off fall Time			10		
V <sub>SD</sub>	Diode Forward Voltage	I <sub>s</sub> =6.8A, V <sub>GS</sub> =0V			1.2	V

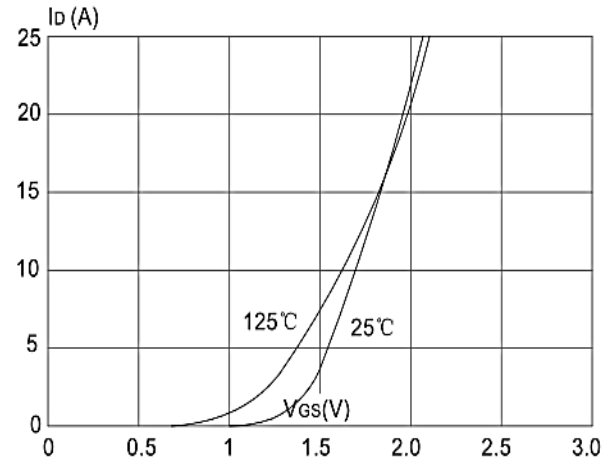
**Note :**

- 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 ID and IDM , in real applications , should be limited by total power dissipation

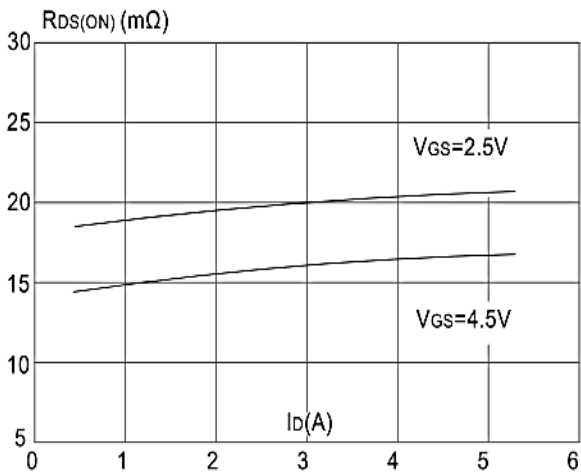
**Typical Characteristics**



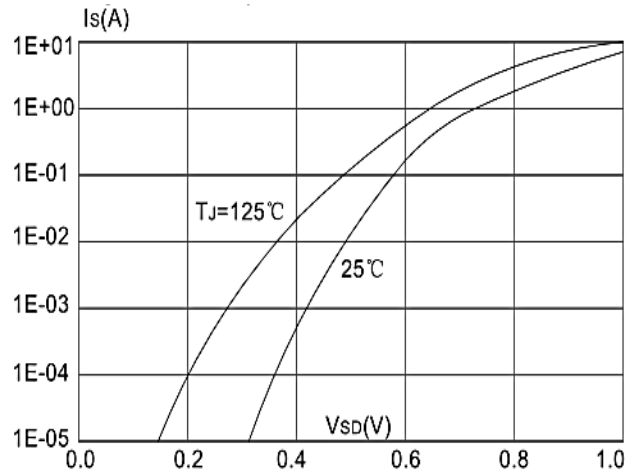
**Figure 1: Output Characteristics**



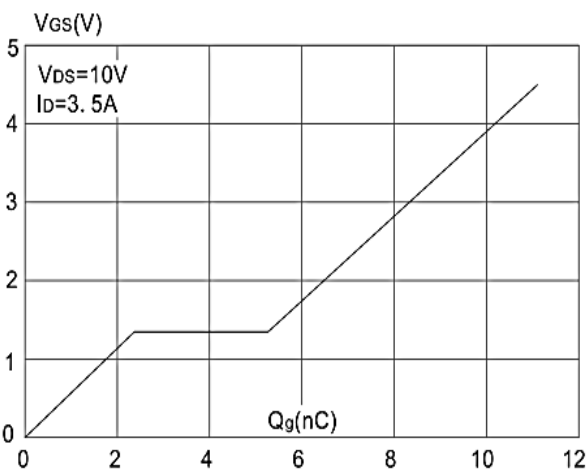
**Figure 2: Typical Transfer Characteristics**



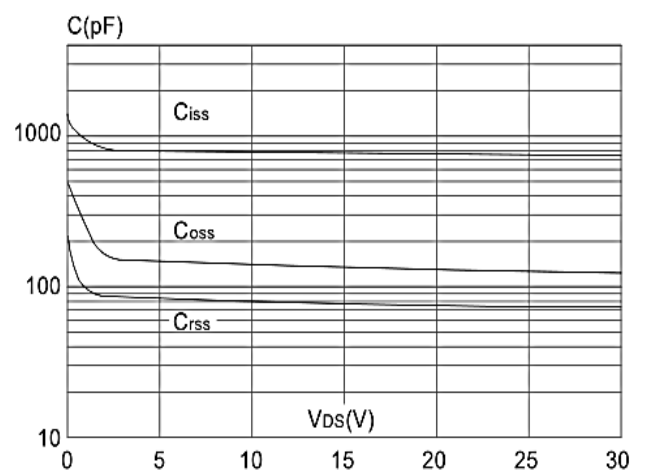
**Figure 3: On-resistance vs. Drain Current**



**Figure 4: Body Diode Characteristics**

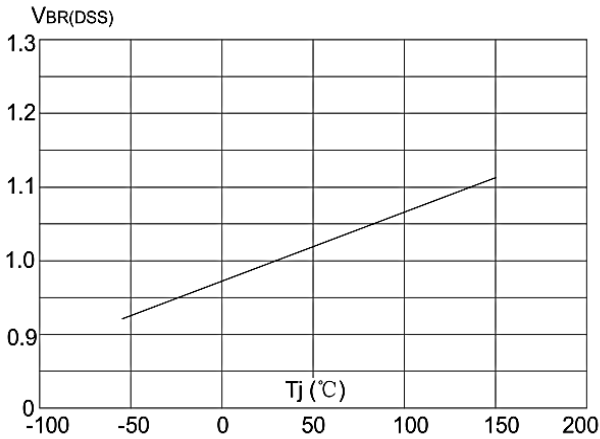


**Figure 5: Gate Charge Characteristics**

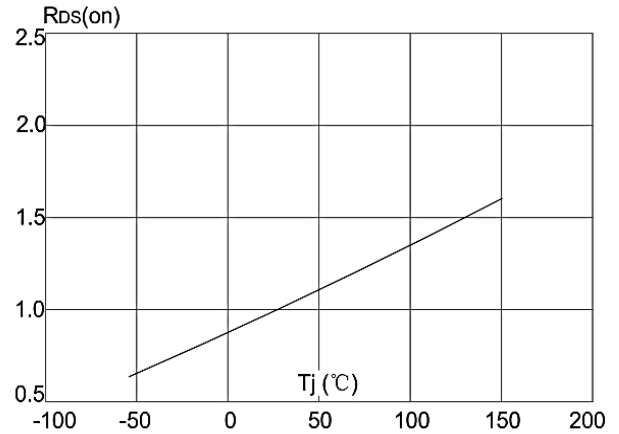


**Figure 6: Capacitance Characteristics**

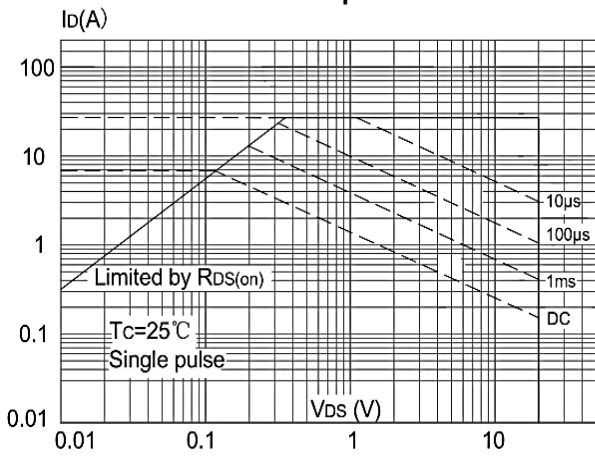
**20V N-Channel Enhancement Mode MOSFET**



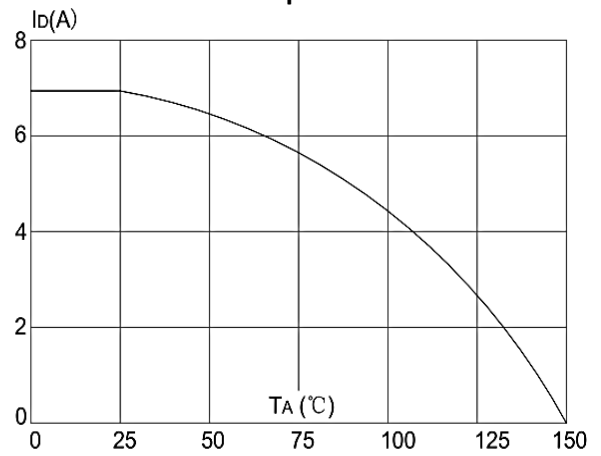
**Figure 7: Normalized Breakdown Voltage vs. Junction Temperature**



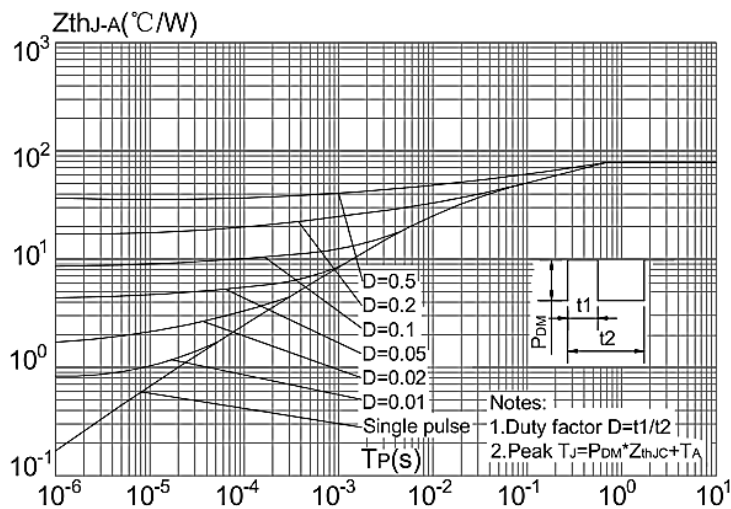
**Figure 8: Normalized on Resistance vs. Junction Temperature**



**Figure 9: Maximum Safe Operating Area vs. Case Temperature**

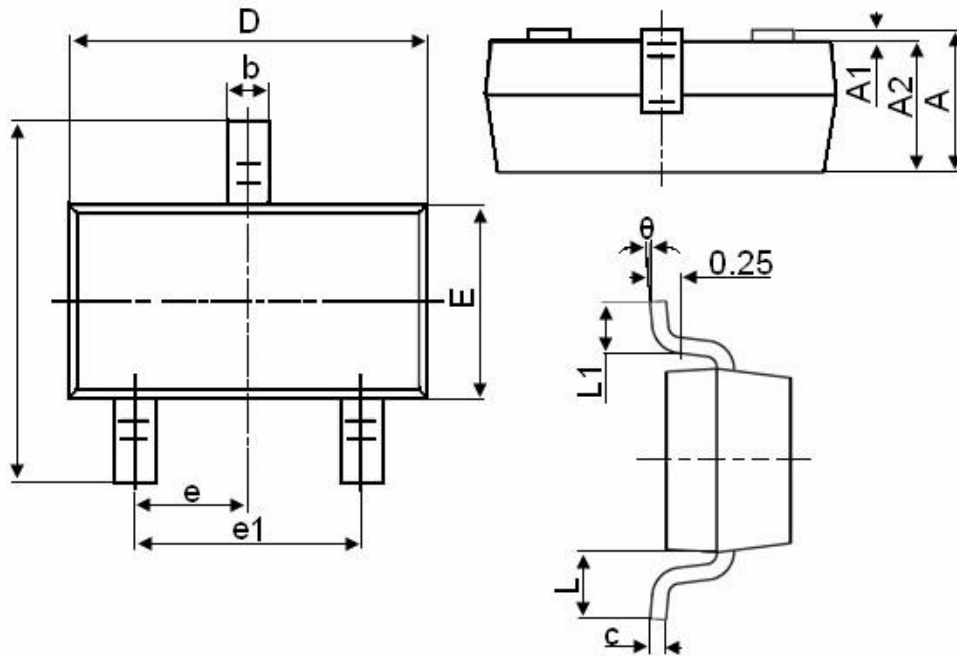


**Figure 10: Maximum Continuous Drain Current vs. Ambient Temperature**



**Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Case**

### Package Mechanical Data-SOT-23-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°

**20V N-Channel Enhancement Mode MOSFET  
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## 20V N-Channel Enhancement Mode MOSFET

Edition	Date	Change
Rve1.0	2020/9/11	Initial release

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