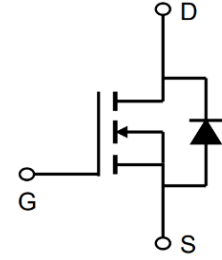


## 20V N-Channel Enhancement Mode MOSFET

### Description

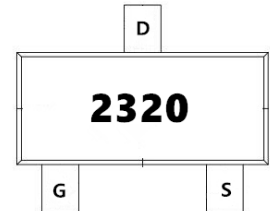
The AP2320MI uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a Battery protection or in other Switching application.



### General Features

$V_{DS} = 20V$   $I_D = 8A$

$R_{DS(ON)} < 12m\Omega @ V_{GS}=4.5V$



### Application

- Battery protection
- Load switch
- Uninterruptible power supply



### Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
AP2320MI	SOT-23-3L	2320	3000

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

Symbol	Parameter	Limit	Unit
$V_{DS}$	Drain-Source Voltage	20	V
$V_{GS}$	Gate-Source Voltage	$\pm 12$	V
$I_D$	Drain Current-Continuous	8	A
$I_D(100^\circ C)$	Drain Current-Continuous( $T_C=100^\circ C$ )	4.5	A
$I_{DM}$	Pulsed Drain Current	75	A
$P_D$	Maximum Power Dissipation	12	W
$E_{AS}$	Single pulse avalanche energy	1	mJ
$T_J, T_{STG}$	Operating Junction and Storage Temperature Range	-55 To 150	$^\circ C$
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	3.8	$^\circ C/W$

## 20V N-Channel Enhancement Mode MOSFET

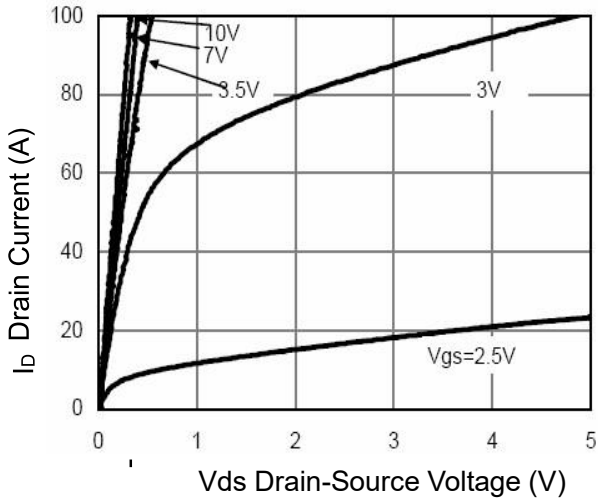
### Electrical Characteristics (T<sub>A</sub>=25°C unless otherwise noted)

Symbol	Parameter	Condition	Min	Typ	Max	Unit
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	20	22	-	V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =20V, V <sub>GS</sub> =0V	-	-	1	μA
I <sub>GSS</sub>	Gate-Body Leakage Current	V <sub>GS</sub> =±12V, V <sub>DS</sub> =0V	-	-	±100	nA
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	0.5	0.65	1.2	V
R <sub>DS(ON)</sub>	Drain-Source On-State Resistance	V <sub>GS</sub> =4.5V, I <sub>D</sub> =6A	-	8.5	12	mΩ
R <sub>DS(ON)</sub>	Drain-Source On-State Resistance	V <sub>GS</sub> =2.5V, I <sub>D</sub> =3A	-	10	15	mΩ
g <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> =5V, I <sub>D</sub> =20A	10	-	-	S
C <sub>ISS</sub>	Input Capacitance	V <sub>DS</sub> =10V, V <sub>GS</sub> =0V, F=1.0MHz		625		PF
C <sub>OSS</sub>	Output Capacitance			162		PF
C <sub>RSS</sub>	Reverse Transfer Capacitance			105		PF
t <sub>d(on)</sub>	Turn-on Delay Time	V <sub>GS</sub> =10V, V <sub>DS</sub> =10V RL=0.5Ω, RGEN=3Ω	-	4.5	-	nS
t <sub>r</sub>	Turn-on Rise Time		-	9.2	-	nS
t <sub>d(off)</sub>	Turn-Off Delay Time		-	18.7	-	nS
t <sub>f</sub>	Turn-Off Fall Time		-	3.3	-	nS
Q <sub>g</sub>	Total Gate Charge	V <sub>GS</sub> =10V, V <sub>DS</sub> =10V, I <sub>D</sub> =20A		15		nC
Q <sub>gs</sub>	Gate-Source Charge			1.8		nC
Q <sub>gd</sub>	Gate-Drain Charge			2.8		nC
V <sub>SD</sub>	Diode Forward Voltage <sup>(Note 3)</sup>	V <sub>GS</sub> =0V, I <sub>S</sub> =25A	-	-	1.2	V
I <sub>S</sub>	Diode Forward Current <sup>(Note 2)</sup>	-	-	-	25	A
t <sub>rr</sub>	Reverse Recovery Time	T <sub>J</sub> = 25°C, I <sub>F</sub> = 20A di/dt = 100A/μs <sup>(Note3)</sup>	-	18	-	nS
Q <sub>rr</sub>	Reverse Recovery Charge		-	9.5	-	nC
t <sub>on</sub>	Forward Turn-On Time	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

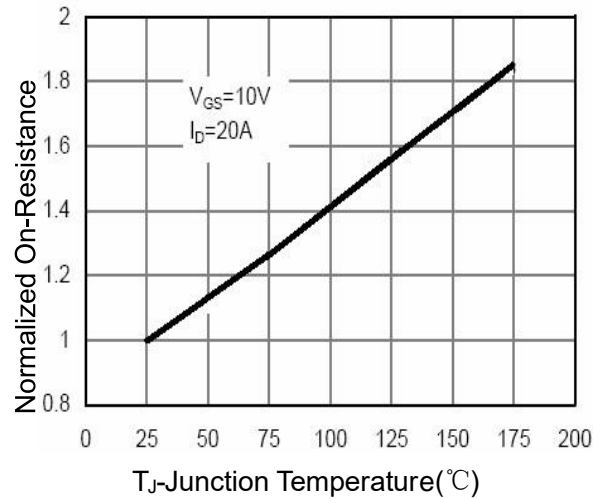
#### Notes:

- 1、Repetitive Rating: Pulse width limited by maximum junction temperature.
- 2、Surface Mounted on FR4 Board, t ≤ 10 sec.
- 3、Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
- 4、Guaranteed by design, not subject to production

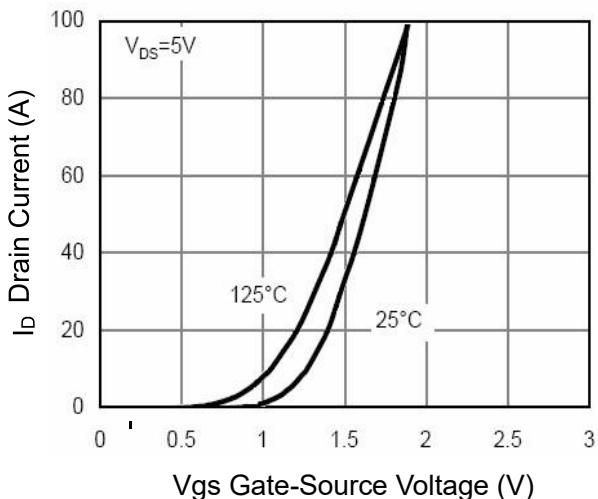
**Typical Characteristics**



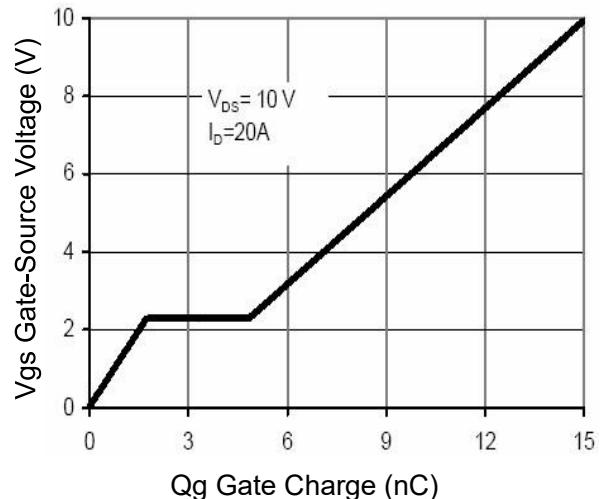
**Figure 1 Output Characteristics**



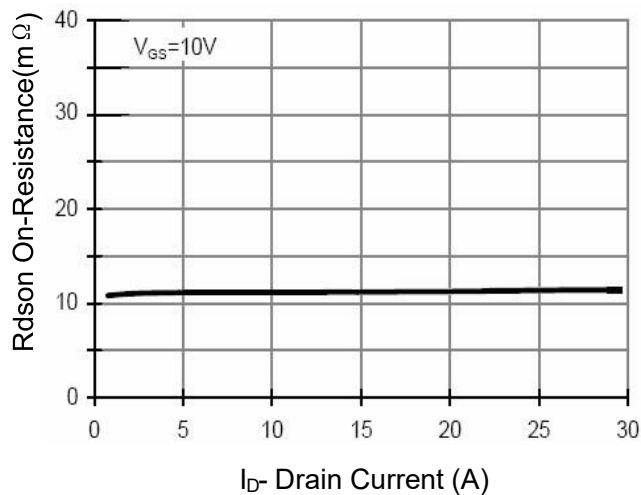
**Figure 4 Rdson-Junction Temperature**



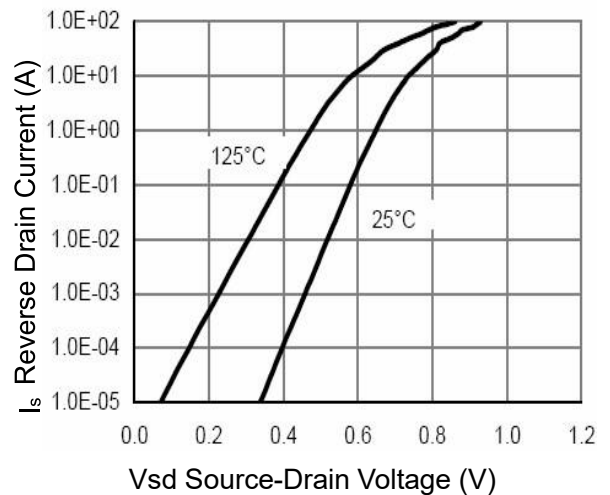
**Figure 2 Transfer Characteristics**



**Figure 5 Gate Charge**

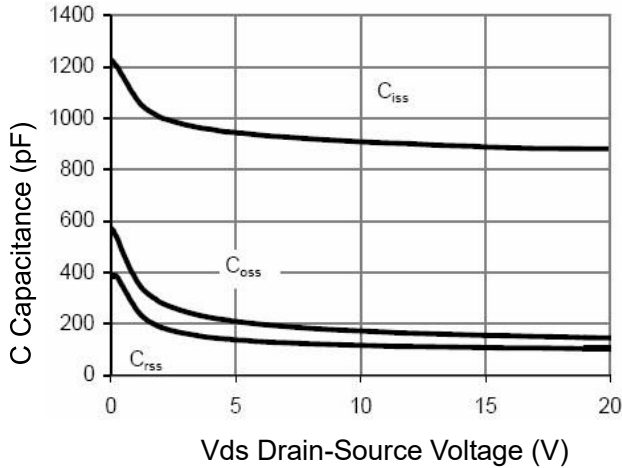


**Figure 3 Rdson-Drain Current**

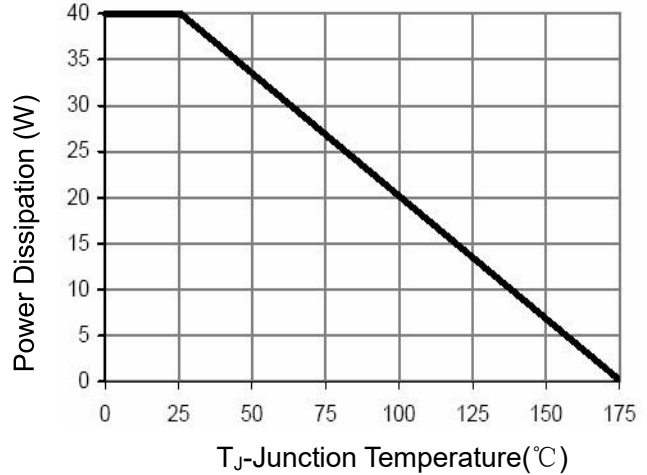


**Figure 6 Source- Drain Diode Forward**

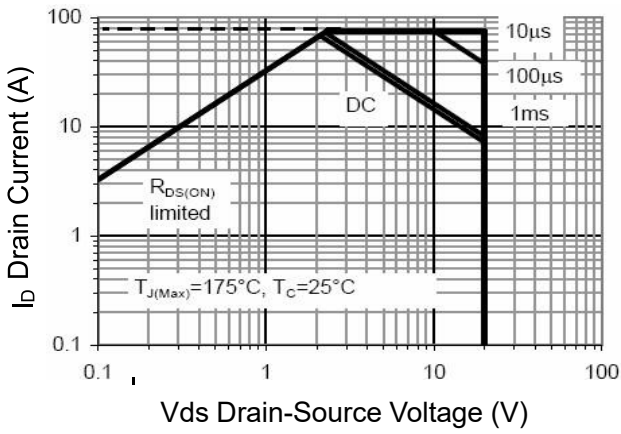
**20V N-Channel Enhancement Mode MOSFET**



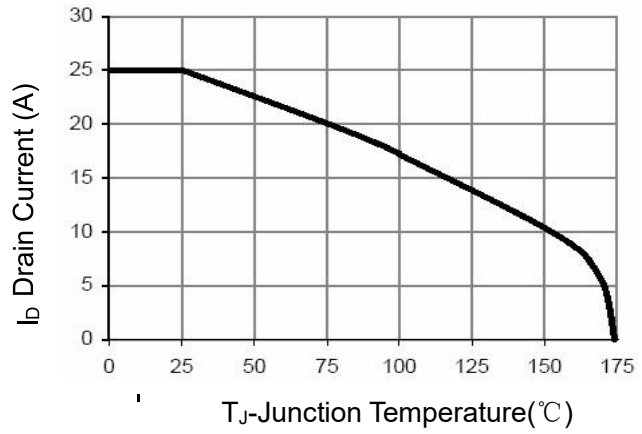
**Figure 7 Capacitance vs Vds**



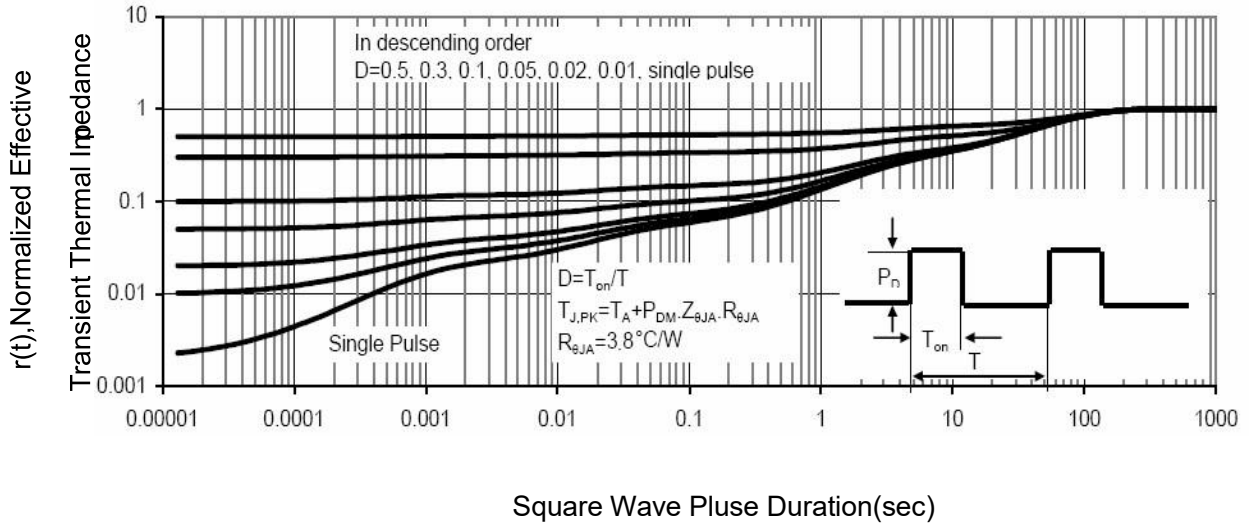
**Figure 9 Power De-rating**



**Figure 8 Safe Operation Area**

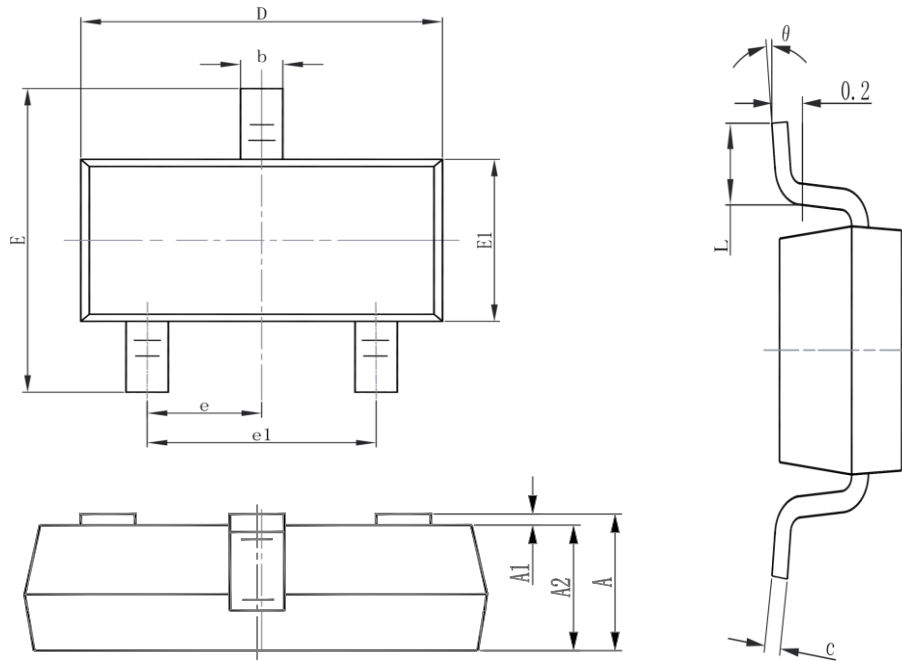


**Figure 10 Current De-rating**



**Figure 11 Normalized Maximum Transient Thermal Impedance**

### Package Mechanical Data-SOT-23-3L



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
$\theta$	0°	8°	0°	8°

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

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Edition	Date	Change
Rve1.0	2019/9/31	Initial release

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