
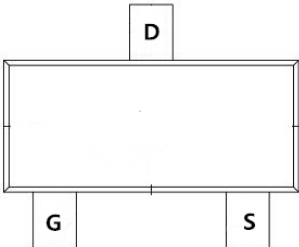


**TM2301AI**

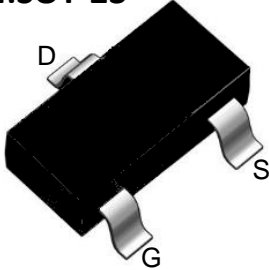
**P-Channel Enhancement Mosfet**

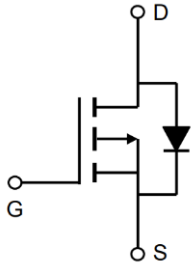
<p><b>General Description</b></p> <ul style="list-style-type: none"> <li>• Low <math>R_{DS(ON)}</math></li> <li>• RoHS and Halogen-Free Compliant</li> </ul> <p><b>Applications</b></p> <ul style="list-style-type: none"> <li>• Load switch</li> <li>• PWM</li> </ul>	<p><b>General Features</b></p> <p><math>V_{DS} = -20V, I_D = -3.0A</math></p> <p><math>R_{DS(ON)} = 62\text{ m}\Omega (\text{typ.}) @ V_{GS} = -4.5V</math></p> <p>100% UIS Tested 100% <math>R_g</math> Tested</p> 
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Marking: 2301 OR A1SHB

**I:SOT-23**





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

Symbol	Parameter	Ratings	Units
$V_{DS}$	Drain-Source Voltage	-20	V
$V_{GS}$	Gate-Source Voltage	$\pm 12$	V
$I_D$	Continuous Drain Current	-3.0	A
$I_{DM}$	Pulsed Drain Current <sup>1</sup>	-10	
$P_D$	Power Dissipation	1	W
$T_J, T_{STG}$	Operating and Storage Junction Temperature Range	-55 to +150	$^\circ\text{C}$

**Thermal Characteristics:**

Symbol	Parameter	Max	Units
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient <sup>1</sup>	125	$^\circ\text{C}/\text{W}$



**TM2301AI**

**P-Channel Enhancement Mosfet**

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

Symbol	Parameter	Conditions	Min	Typ	Max	Units
<b>Off Characteristics</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=-250 \mu A$	-20	---	---	V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{GS}=0V, V_{DS}=-20V$	---	---	-1	$\mu A$
$I_{GSS}$	Gate-Source Leakage Current	$V_{GS}=\pm 12V, V_{DS}=0A$	---	---	$\pm 100$	nA
<b>On Characteristics</b>						
$V_{GS(th)}$	GATE-Source Threshold Voltage	$V_{GS}=V_{DS}, I_D=-250 \mu A$	-0.4	-0.7	-1	V
$R_{DS(on)}$	Drain-Source On Resistance	$V_{GS}=-4.5V, I_D=-3A$	---	62	76	m $\Omega$
		$V_{GS}=-2.5V, I_D=-3A$	---	78	98	
$G_{FS}$	Forward Transconductance	$V_{DS}=-5V, I_D=-2A$	---	8	---	S
<b>Dynamic Characteristics</b>						
$C_{iss}$	Input Capacitance	$V_{DS}=-10V, V_{GS}=0V, f=1MHz$	---	480	---	pF
$C_{oss}$	Output Capacitance		---	83	---	
$C_{rss}$	Reverse Transfer Capacitance		---	54	---	
<b>Switching Characteristics</b>						
$t_{d(on)}$	Turn-On Delay Time	$V_{DD}=-10V, I_D=-1A, R_L=2.8\Omega, V_{GS}=-4.5V, R_G=6\Omega$	---	11	---	ns
$t_r$	Rise Time		---	52	---	ns
$t_{d(off)}$	Turn-Off Delay Time		---	17	---	ns
$t_f$	Fall Time		---	10	---	ns
$Q_g$	Total Gate Charge	$V_{GS}=-4.5V, V_{DS}=-10V, I_D=-3$	---	4	---	nC
$Q_{gs}$	Gate-Source Charge		---	0.7	---	nC
$Q_{gd}$	Gate-Drain "Miller" Charge		---	1.2	---	nC
<b>Drain-Source Diode Characteristics</b>						
$V_{SD}$	Source-Drain Diode Forward Voltage <sup>1</sup>	$V_{GS}=0V, I_S=-3A$	---	---	-1.2	V
$I_{SD}$	Source-Drain Current(Body Diode)		---	---	-3	A

**Notes:**

1. Repetitive Rating: Pulse width limited by maximum junction temperature.

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Figure1. Power Dissipation

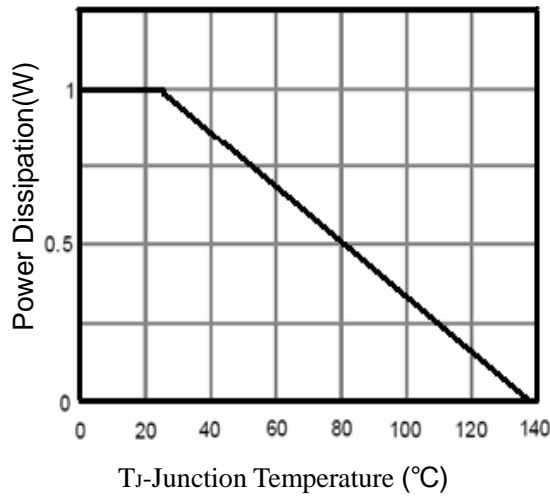


Figure2. Drain Current

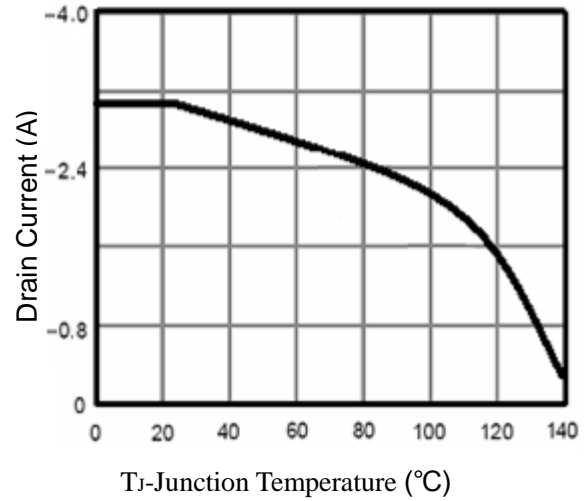


Figure3. Output Characteristics

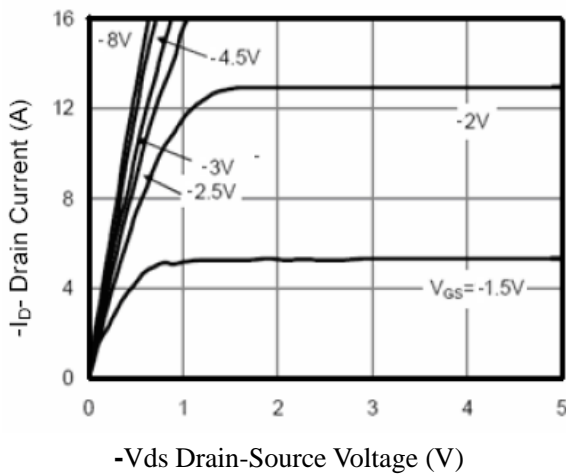


Figure4. Transfer Characteristics

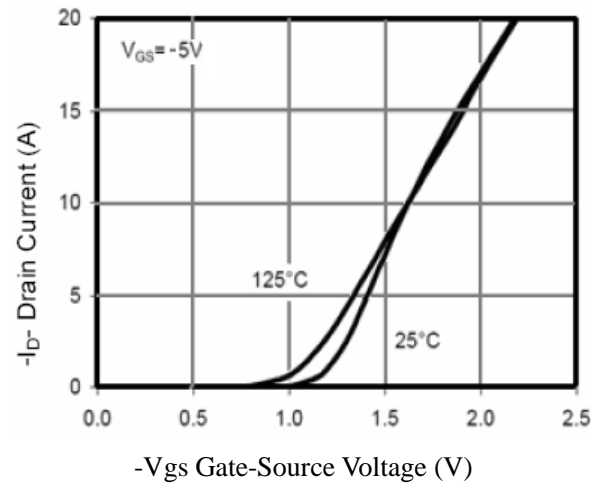


Figure5. Capacitance

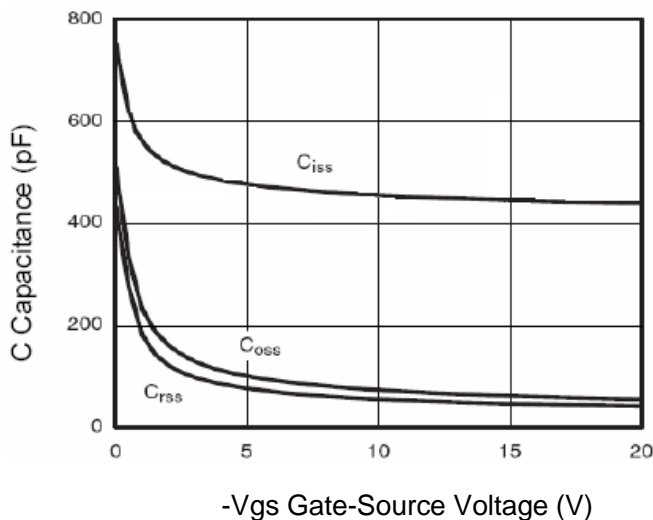
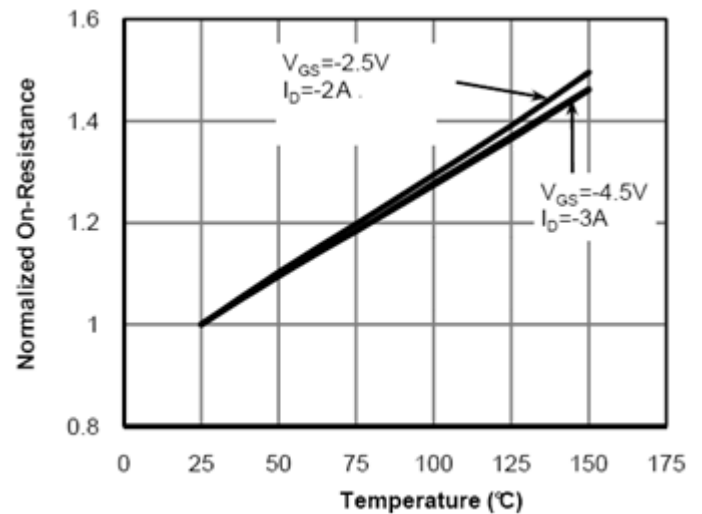


Figure6. RDS(ON) vs Junction Temperature



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Figure7. Max  $BV_{DSS}$  vs Junction Temperature

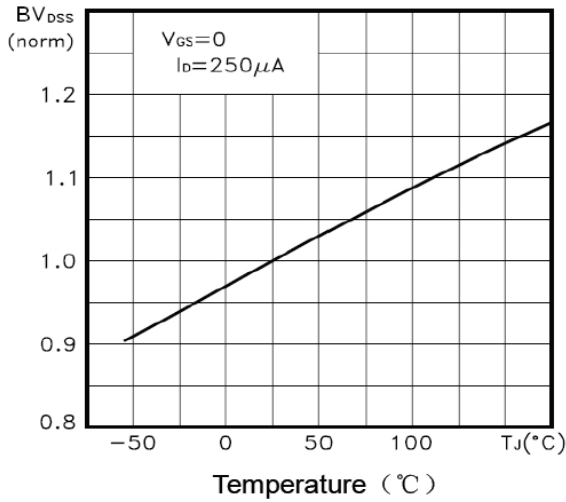


Figure8.  $V_{GS(th)}$  vs Junction Temperature

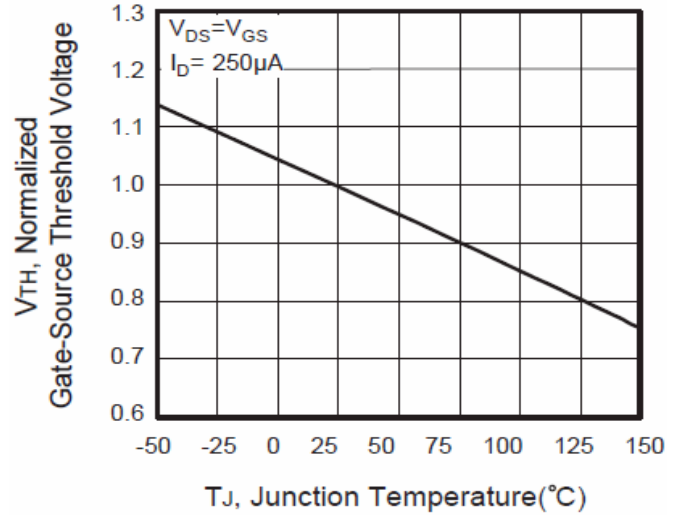


Figure9. Gate Charge Waveforms

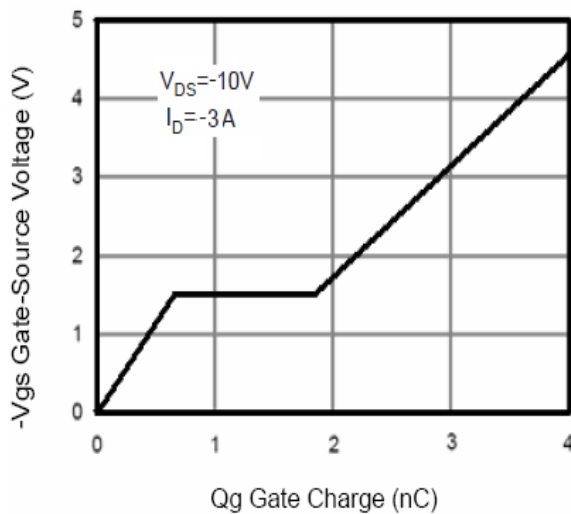


Figure10. Maximum Safe

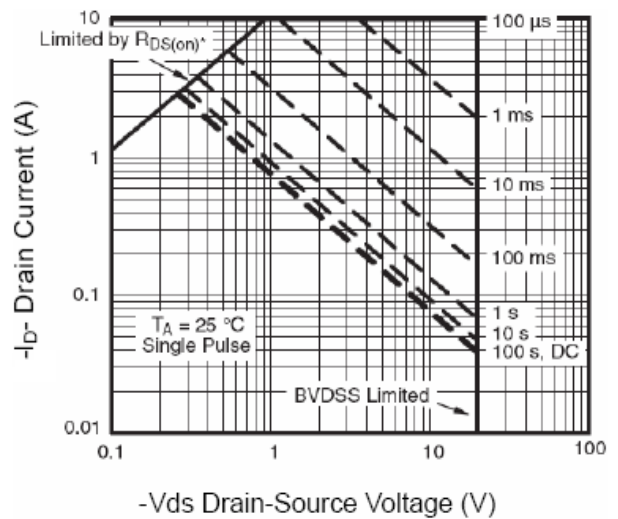
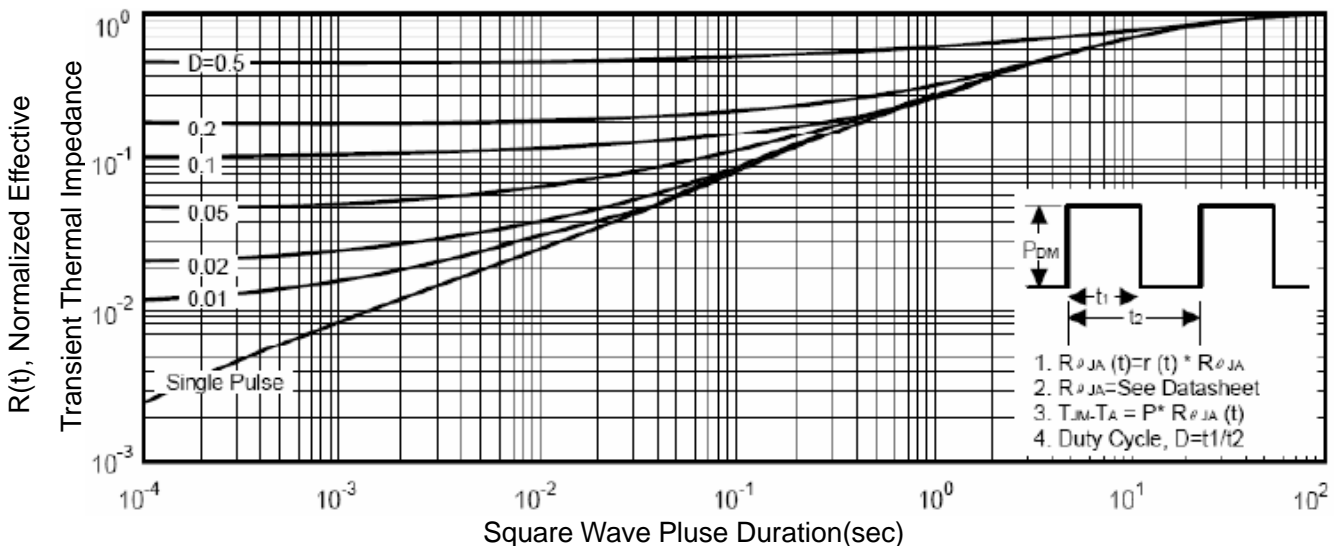
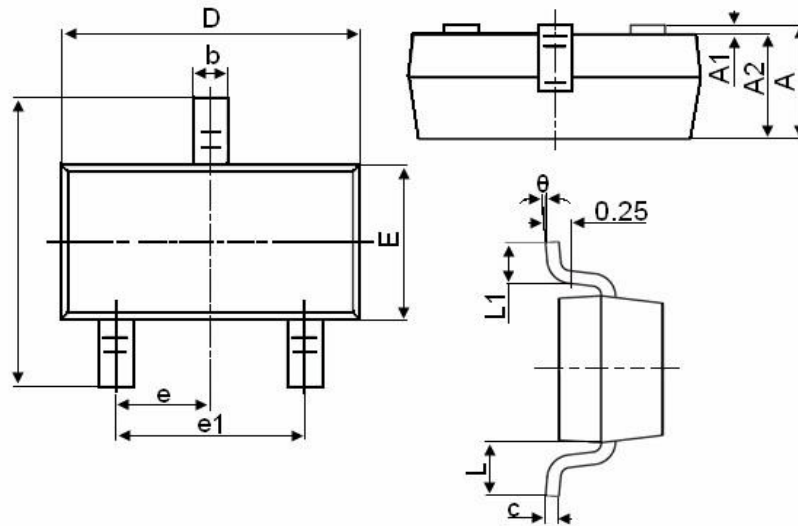


Figure11. Normalized Maximum Transient Thermal Impedance





## Package Mechanical Data:SOT-23



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
θ	0°	8°