TM2301AI
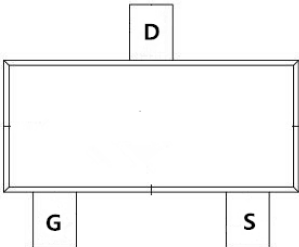
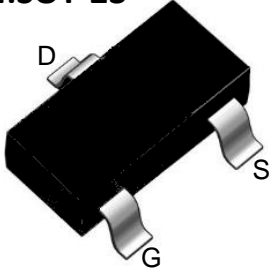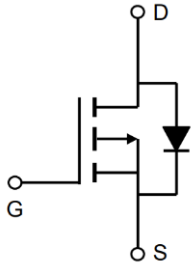## P-Channel Enhancement Mosfet

General Description
• Low $R_{DS(ON)}$
• RoHS and Halogen-Free Compliant

Applications
• Load switch
• PWM

General Features
$V_{DS} = -20V, I_D = -3.0A$

$R_{DS(ON)} = 62\, m\Omega\,(typ.) @\ V_{GS} = -4.5V$

100% UIS Tested
100% R_g Tested

Green
Product

I:SOT-23

D

G   S

Marking: 2301 OR A1SHB

D

S

G

D

G

S

Absolute Maximum Ratings：(T_C=25℃ unless otherwise noted)

Symbol	Parameter	Ratings	Units
V_{DS}	Drain-Source Voltage	-20	V
V_{GS}	Gate-Source Voltage	±12	V
I_D	Continuous Drain Current	-3.0	A
I_{DM}	Pulsed Drain Current[1]	-10	
P_D	Power Dissipation	1	W
T_J, T_{STG}	Operating and Storage Junction Temperature Range	-55 to +150	℃

Thermal Characteristics：

Symbol	Parameter	Max	Units
$R_{\theta JA}$	Thermal Resistance,Junction to Ambient[1]	125	℃/W

Electrical Characteristics： (T_C=25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain-Sourtce Breakdown Voltage	V_{GS}=0V,I_D=-250μA	-20	---	---	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{GS}=0V, V_{DS}=-20V	---	---	-1	μA
I_{GSS}	Gate-Source Leakage Current	V_{GS}=±12V, V_{DS}=0A	---	---	±100	nA
On Characteristics						
$V_{GS(th)}$	GATE-Source Threshold Voltage	V_{GS}=V_{DS}, I_D=-250μA	-0.4	-0.7	-1	V
$R_{DS(ON)}$	Drain-Source On Resistance	V_{GS}=-4.5V,I_D=-3A	---	62	76	mΩ
		V_{GS}=-2.5V,I_D=-3A		78	98	
G_{FS}	Forward Transconductance	V_{DS}=-5V, I_D=-2A	---	8	---	S
Dynamic Characteristics						
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	---	
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DD}=-10V,I_D=-1A, R_L=2.8Ω. V_{GS}=-4.5V,R_G=6Ω	---	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
Drain-Source Diode Characteristics						
V_{SD}	Source-Drain Diode Forward Voltage[1]	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.

Figure1. Power Dissipation

Power Dissipation(W) vs T_J-Junction Temperature (°C)

Figure2. Drain Current

Drain Current (A) vs T_J-Junction Temperature (°C)
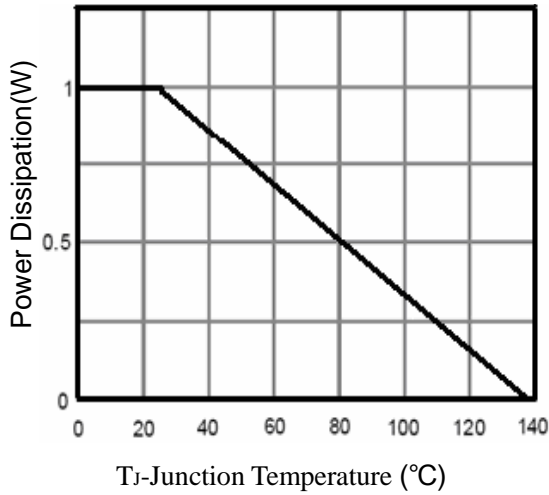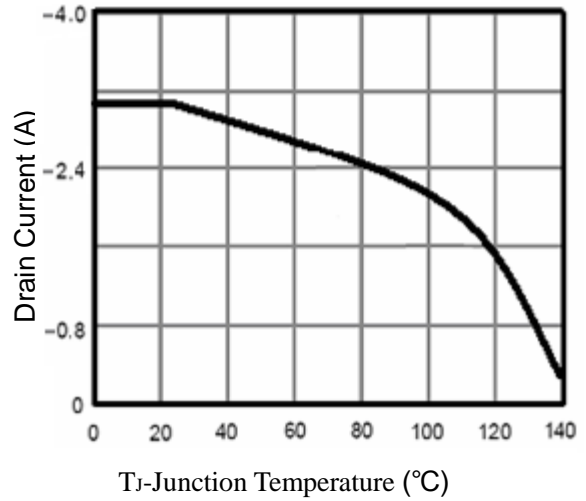
Figure3. Output Characteristics

$-I_D$- Drain Current (A) vs -Vds Drain-Source Voltage (V)
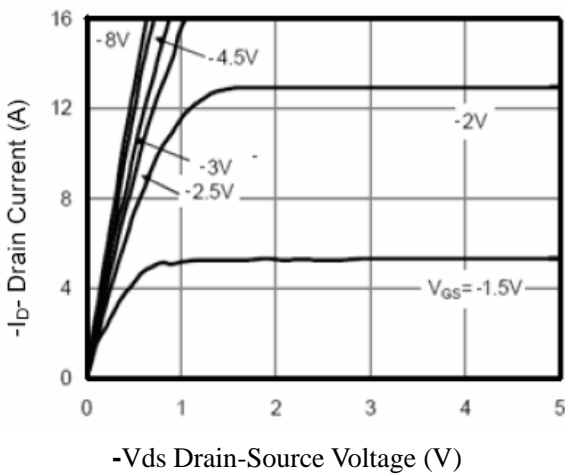
Figure4. Transfer Characteristics

$-I_D$- Drain Current (A) vs -Vgs Gate-Source Voltage (V)

Figure5. Capacitance

C Capacitance (pF) vs -Vgs Gate-Source Voltage (V)
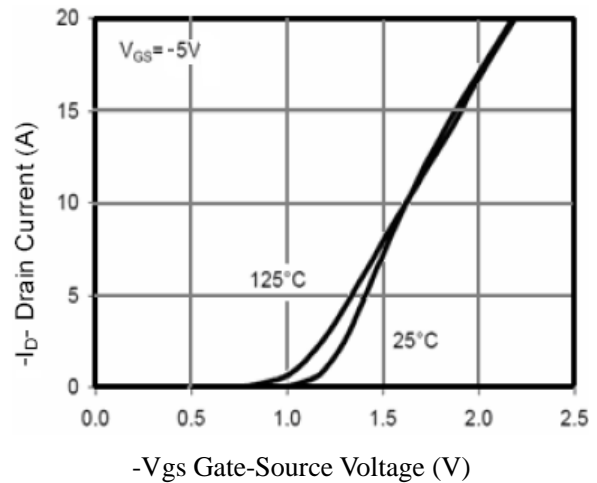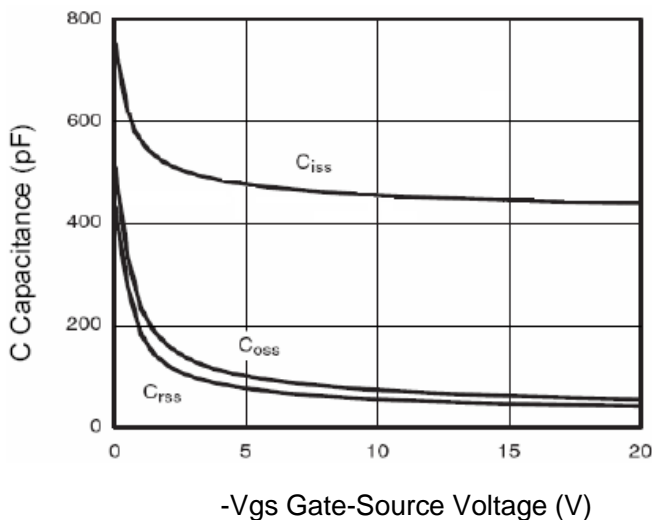
Figure6. $R_{DS(ON)}$ vs Junction Temperature

Normalized On-Resistance vs Temperature (°C)

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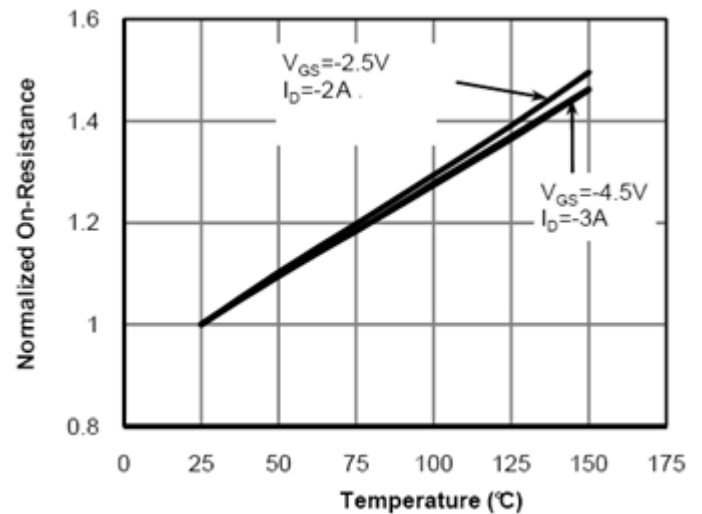
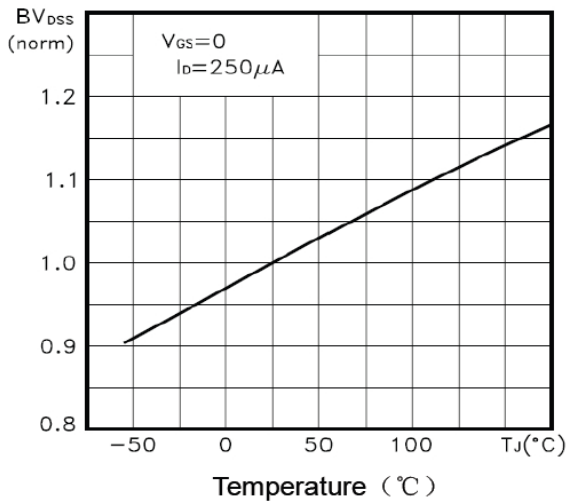**Figure7. Max BV$_{DSS}$ vs Junction Temperature**
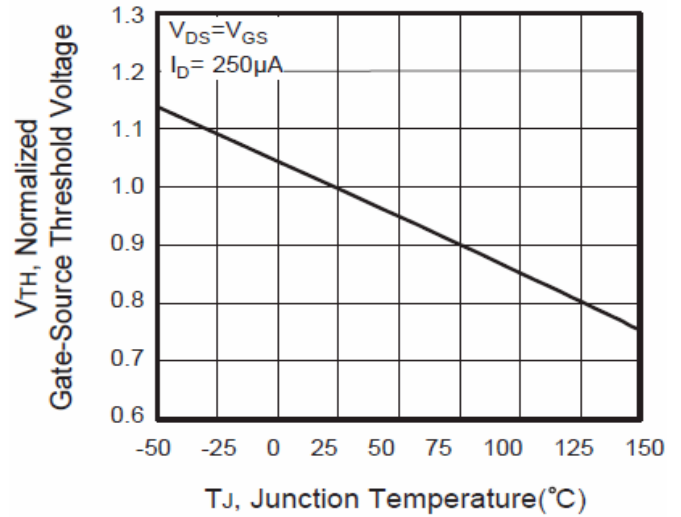

Figure8. V$_{GS(th)}$ vs Junction Temperature
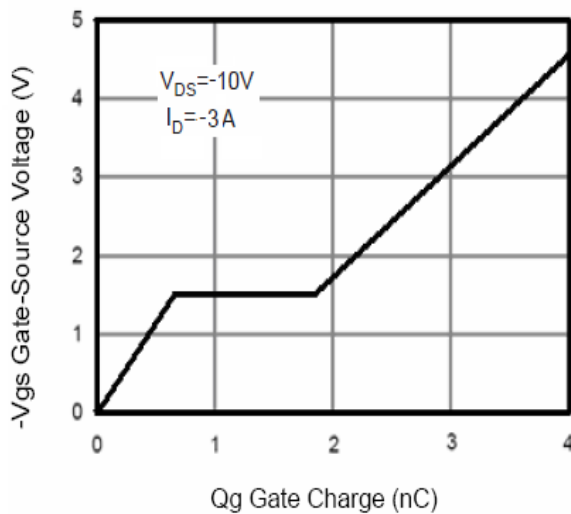

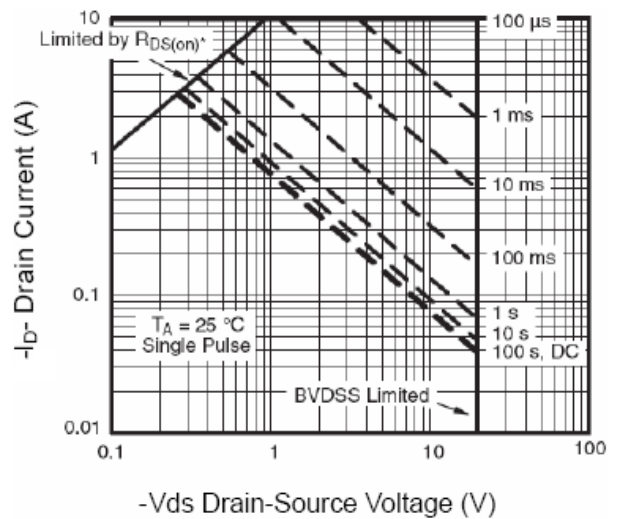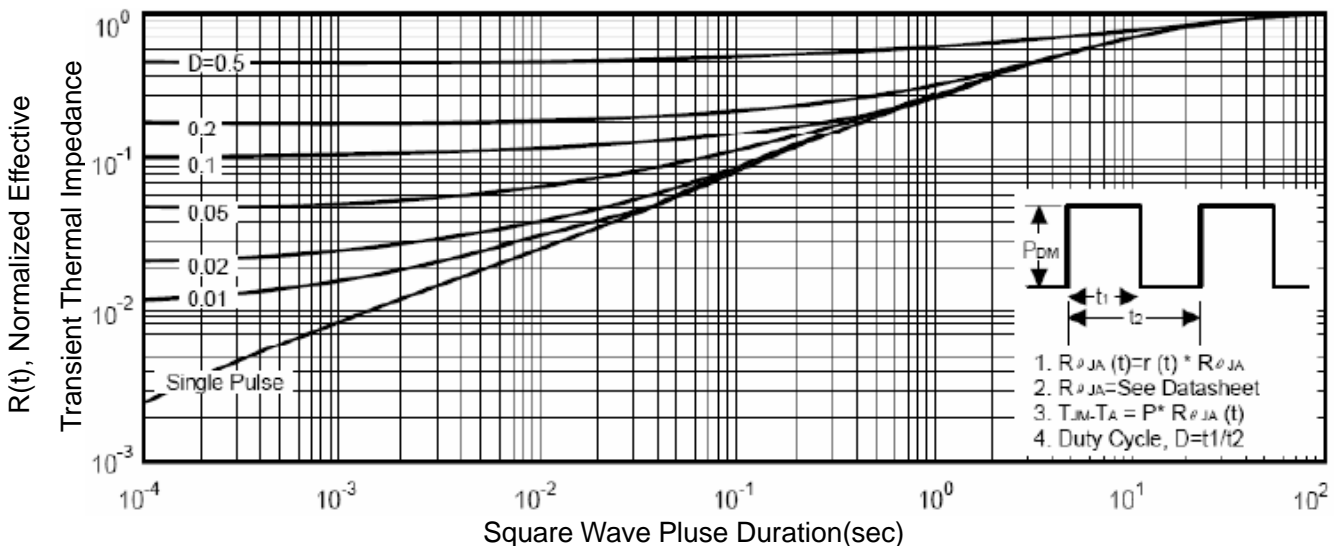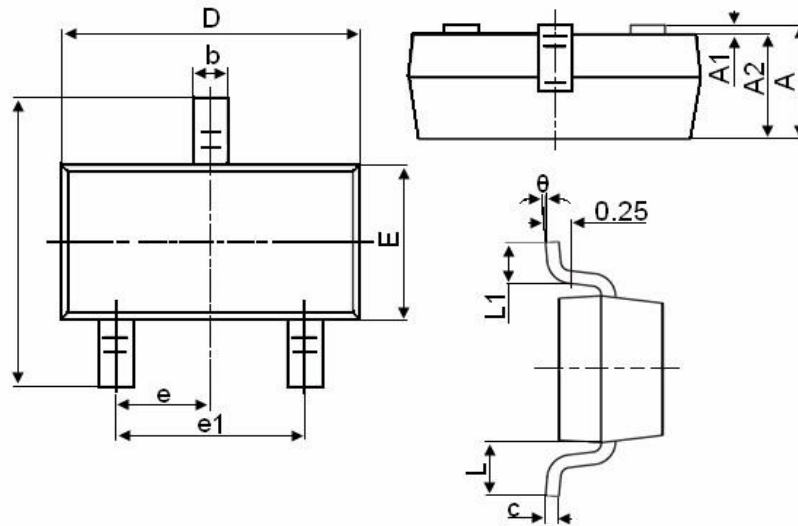
Figure9. Gate Charge Waveforms

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°

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