P-Channel Enhancement Mode Power MOSFET **MX2301L**

DESCRIPTION

The MX2301L uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate. This device is suitable for use as a low switch or in PWM applications.

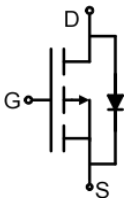
GENERAL FEATURES

- V_{DS}=-20V, I_D=-3A
  $R_{DS(ON)}$(Typ.)=70mΩ @ V_{GS}=-4.5V
  $R_{DS(ON)}$(Typ.)=110mΩ @ V_{GS}=-2.5V
- High Power and current handing capability
- Lead free product is acquired
- Surface Mount Package

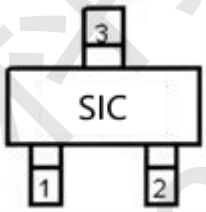
APPLICATION

- PWM applications
- Load switch
- Power management

PINOUT



Schematic diagram



Marking and pin Assignment


SOT-23 top view

ORDERING INFORMATION

Part Number	StorageTemperature	Package	Devices Per Reel
MX2301L	-55°C to 150°C	SOT-23	3000

ABSOLUTE MAXIMUM RATINGS(T_A=25°C unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	-20	V
Gate-Source Voltage	V_{GS}	±12	V
Drain Current-Continuous	I_D	-3	A
Pulsed Drain Current(Note1)	I_{DM}	-8	A
Maximum Power Dissipation	P_D	1	W
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 150	°C

THERMAL RESISTANCE

Thermal Resistance, Junction-to-Ambient(Note2)	$R_{\theta JA}$	112	°C/W

Note 1. Repetitive Rating: Pulse width limited by maximum junction temperature.
Note 2. Surface Mounted on FR4 Board, t ≤ 10 sec.

ELECTRICAL CHARACTERISTICS(T_A=25°C unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V, I_D=-250μA	-20	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=-15V, V_{GS}=0V	-	-	-1	μA
Gate-Body Leakage Current	I_{GSS}	V_{GS}=±12V, V_{DS}=0V	-	-	±100	nA
On Characteristics(Note1)						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=-250μA	-0.4	-1	-1.2	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=-4.5V, I_D=-2A	-	70	90	mΩ
		V_{GS}=-2.5V, I_D=-2A	-	110	140	mΩ
Forward Transconductance	g_{FS}	V_{GS}=-5V, I_D=-2A	-	8	-	S
Dynamic Characteristics(Note2)						
Input Capacitance	C_{iss}	V_{DS}=-10V, V_{GS}=0V, F=1.0MHz	-	234	-	pF
Output Capacitance	C_{oss}		-	34	-	pF
Reverse Transfer Capacitance	C_{rss}		-	24	-	pF
Switching Characteristics(Note2)						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=-10V, I_D=-1A, V_{GS}=-10V,R_{GEN}=3Ω	-	0.6	-	nS
Turn-on Rise Time	t_r		-	3	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	5	-	nS
Turn-Off Fall Time	t_f		-	2	-	nS
Total Gate Charge	Q_g	V_{DS}=-10V, I_D=-1A, V_{GS}=-4.5V	-	2	-	nC
Gate-Source Charge	Q_{gs}		-	0.3	-	nC
Gate-Drain Charge	Q_{gd}		-	0.6	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage(Note 1)	V_{SD}	V_{GS}=0V, I_S=-1A	-	-	-1.2	V

Note 1. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
Note 2. Guaranteed by design, not subject to product.

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

Figure 1. Output Characteristic

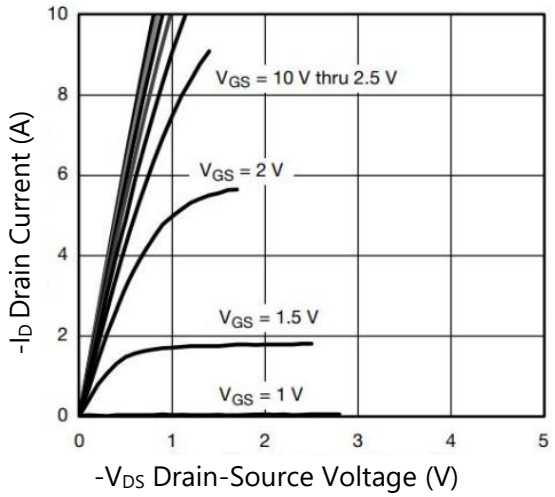


Figure 2. Transfer Characteristic

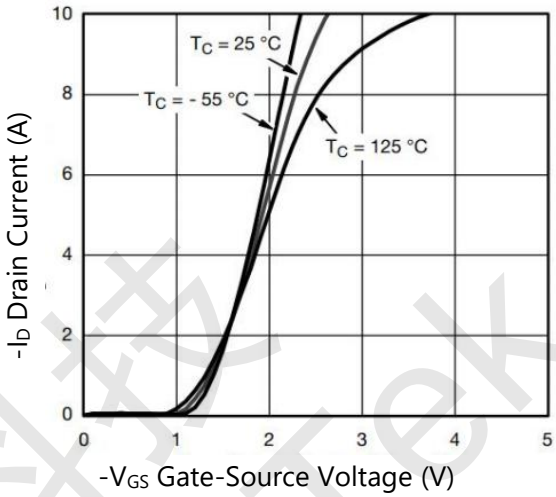


Figure 3. Capacitance

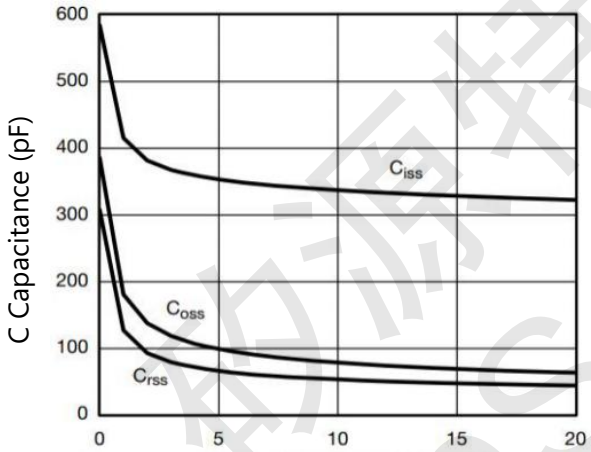


Figure 4. Gate Charge

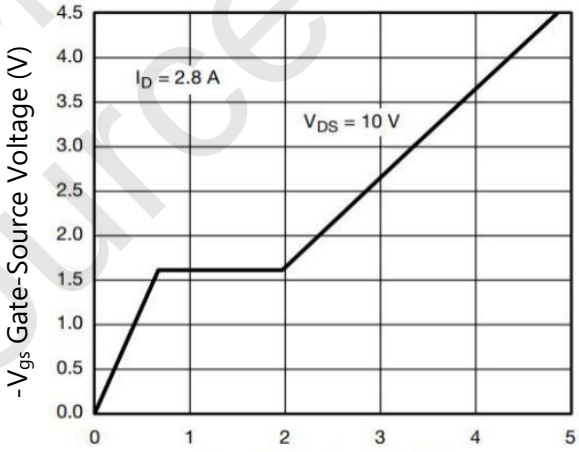


Figure 5. Power Rating

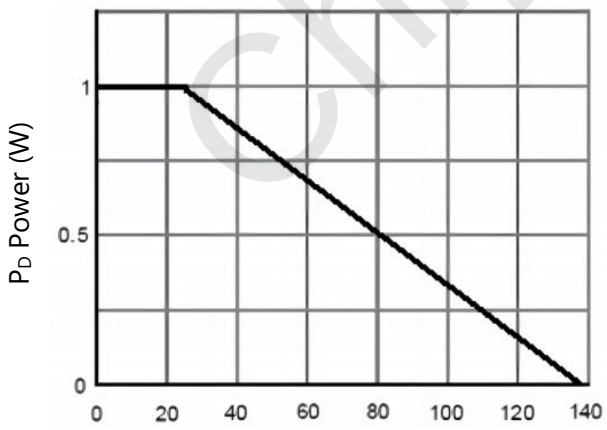
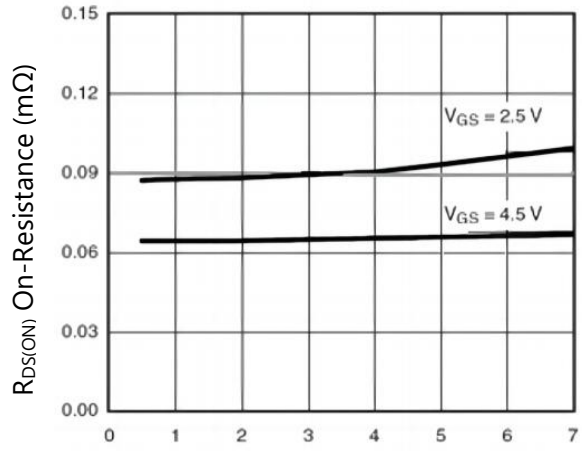


Figure 6. On-Resistance



TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

Figure 7. Source Diode Forward Voltage

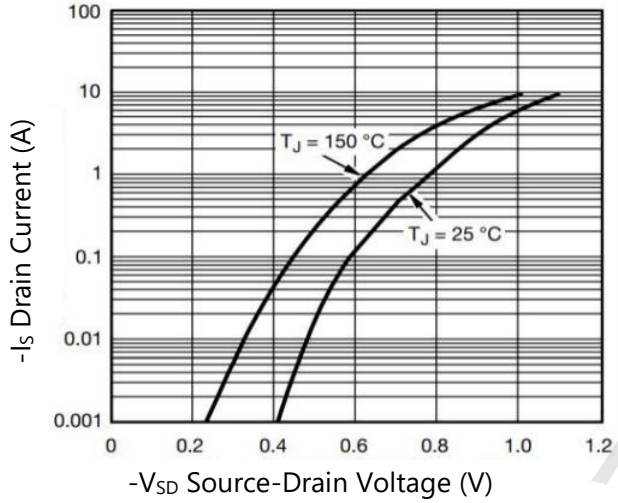


Figure 8. On-Resistance vs. Junction Temperature

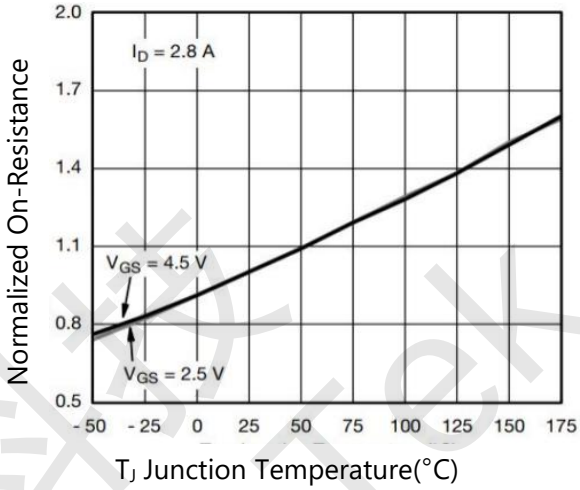


Figure 9. Maximum Safe Operating Area

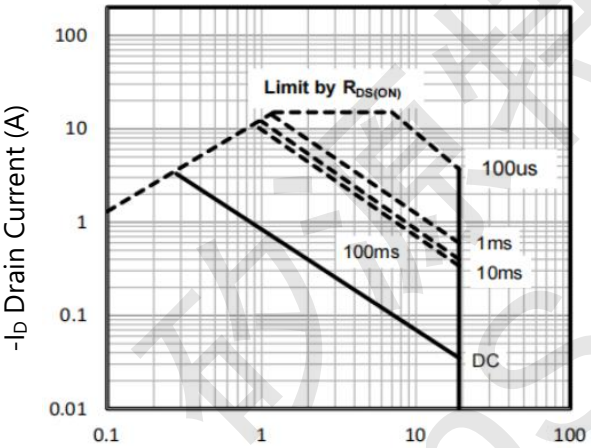


Figure 9. Threshold Voltage

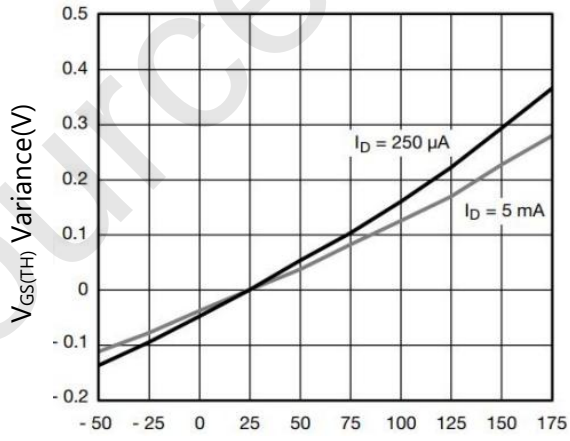
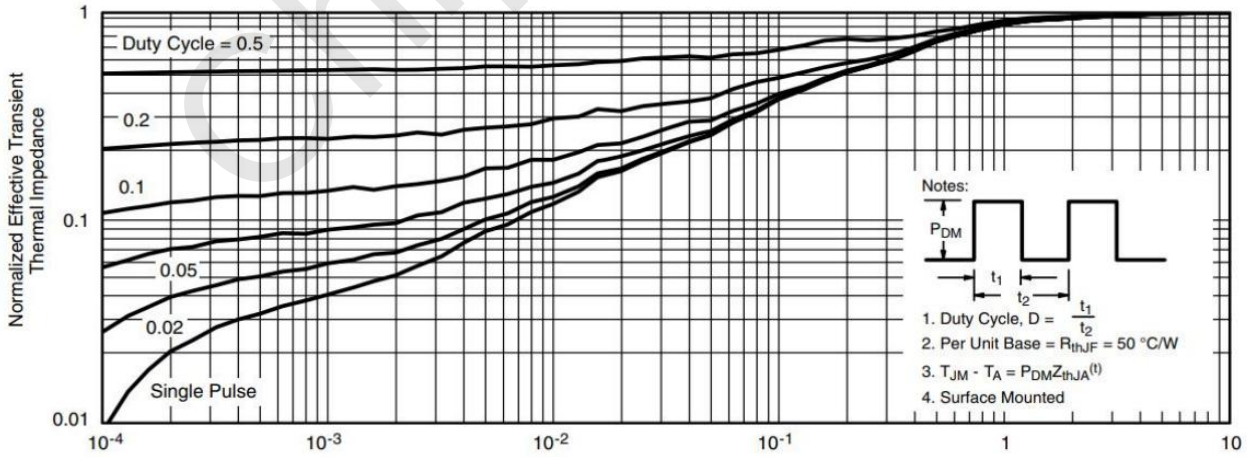


Figure 10. Normalized Thermal Transient Impedance



TEST CIRCUIT AND WAVEFORMS

Figure 1. Gate Charge Test Circuit and Waveforms

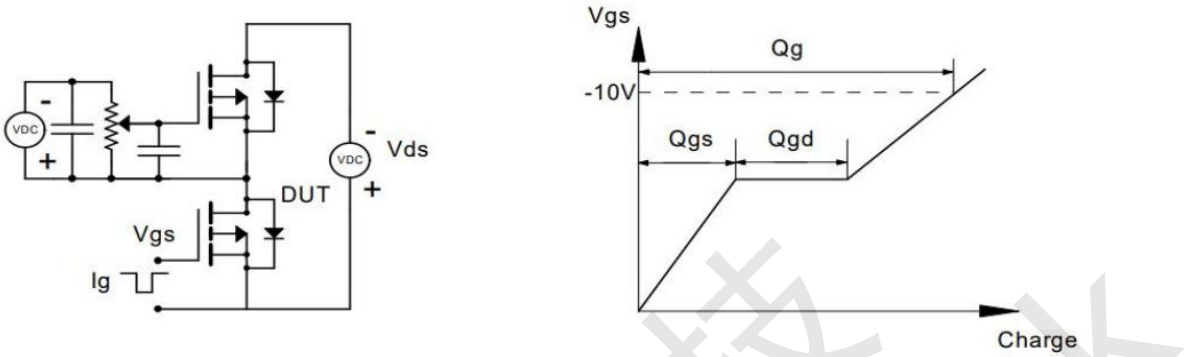


Figure 2. Resistive Switching Test Circuit and Waveforms

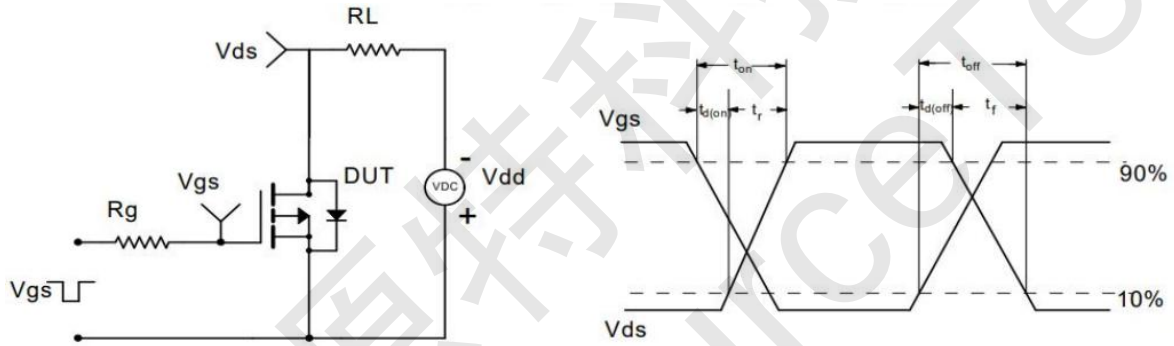


Figure 3. Unclamped Inductive Switching(UIS) Test Circuit and Waveforms

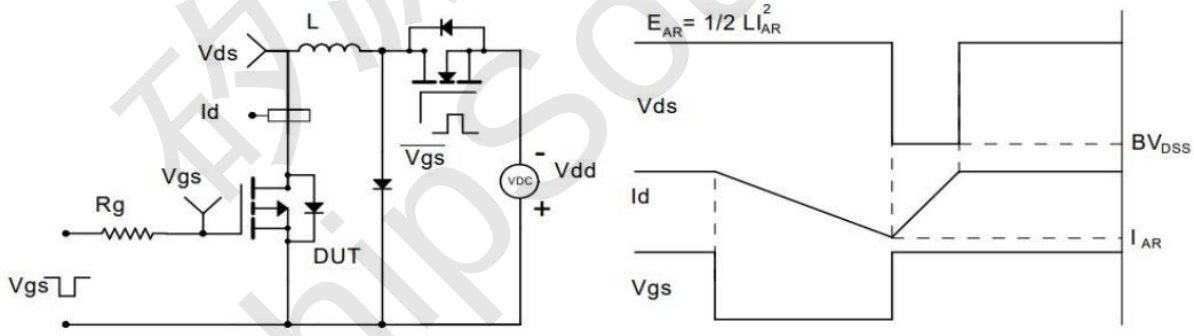
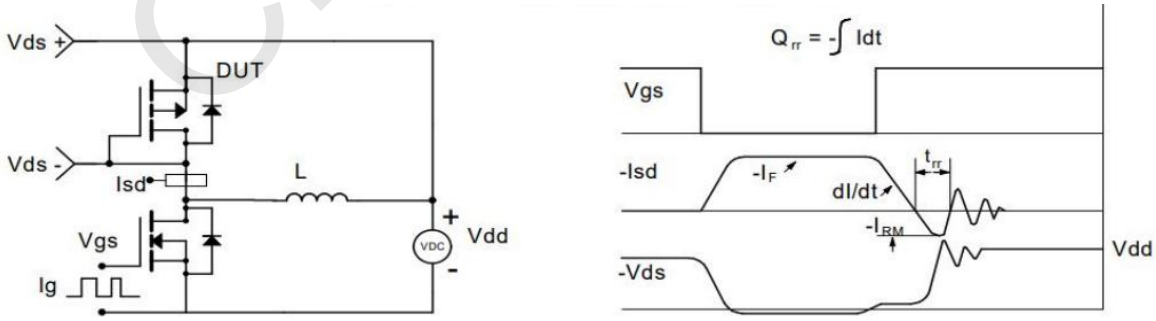
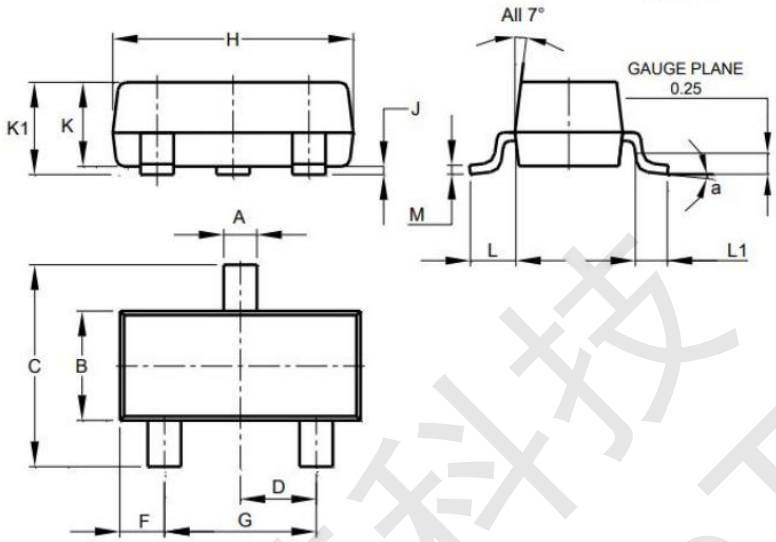


Figure 4. Diode Recovery Test Circuit and Waveforms



PACKAGE INFORMATION

SOT-23



Symbol	Dimensions In Millimeters		
	Min.	Typ.	Max.
A	0.37	0.40	0.51
B	1.20	1.30	1.40
C	2.30	2.40	2.50
D	0.89	0.915	1.03
F	0.45	0.535	0.60
G	1.78	1.83	2.05
H	2.80	2.90	3.00
J	0.013	0.05	0.10
K	0.89	0.975	1.00
K1	0.903	1.025	1.10
L	0.45	0.55	0.61
L1	0.25	0.40	0.55
M	0.085	0.110	0.150
a	0°	8°	-