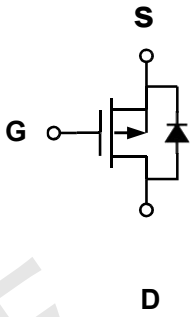
P-Channel Enhancement Mode Power MOSFET

Description

The MX2301A uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 1.8V.

This device is suitable for use as a load switch or in PWM applications.



Schematic diagram

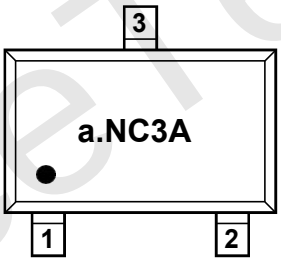
General Features

V_{DS} =-20V，I_D =-3A
@V_{GS}=-2.5V $R_{DS(ON)}$(Typ.)=110mΩ
@V_{GS}=-4.5V $R_{DS(ON)}$(Typ.)=85mΩ

High power and current handing capability
Lead free product is acquired
Surface mount package

Application

PWM applications
Load switch



Marking and pin assignment

SOT-23 (TOP VIEW)

Ordering Information

Part Number	Marking	StorageTemperature	Package	Devices Per Reel
MX2301A	a.NC3A	-55°C to +150°C	SOT-23	3000

Absolute Maximum Ratings (TA=25℃ 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
Drain Current -Pulsed (Note 1)	I_{DM}	-10	A
Maximum Power Dissipation	P_D	1	W
Operating Junction and Storage Temperature Range	T_J,T_{STG}	-55 To 150	℃

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Electrical Characteristics (TA=25℃ unless otherwise noted)

Parameter	Symbol	Condition	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}=-20V, V_{GS}=0V	-	-	-1	μA
Gate-body leakage	I_{GSS}	V_{DS}=0V, V_{GS}=±12V	-	-	±100	nA
ON Characteristics						
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=-250μA	-0.45	-0.7	-1.0	V
Drain-source on-state resistance	$R_{DS(ON)}$	V_{GS}=-4.5V, I_D=-2.5A	-	85	110	mΩ
		V_{GS}=-2.5V, I_D=-2A	-	110	140	
Forward transconductance	gfs	V_{GS}=-5V, I_D=-2.8A	-	-9.5	-	V
Dynamic Characteristics						
Input capacitance	C_{ISS}	V_{DS}=-10V ,V_{GS}=0V f=1.0MHz	-	405	-	pF
Output capacitance	C_{OSS}		-	75	-	
Reverse transfer capacitance	C_{RSS}		-	55	-	
Switching Characteristics						
Turn-on delay time	$t_{D(ON)}$	V_{DD}=-10V I_D=-1A V_{GS}=-4.5V R_{GEN}=10oh m	-	11	-	ns
Rise time	tr		-	35	-	
Turn-off delay time	$t_{D(OFF)}$		-	30	-	
Fall time	tf		-	10	-	
Total gate charge	Qg	V_{DS}=-10V,I_D=-3A V_{GS}=-2.5V	-	3.3	-	nC
Gate-source charge	Qgs		-	0.7	-	
Gate-drain charge	Qgd		-	1.3	-	
DRAIN-SOURCE DIODE CHARACTERISTICS						
Diode forward voltage	V_{SD}	V_{GS}=0V,Is=-4.2A	-		-	-1.2 V

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

Thermal Characteristics

Thermal Resistance junction-to ambient	Rth JA	125	℃/W

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

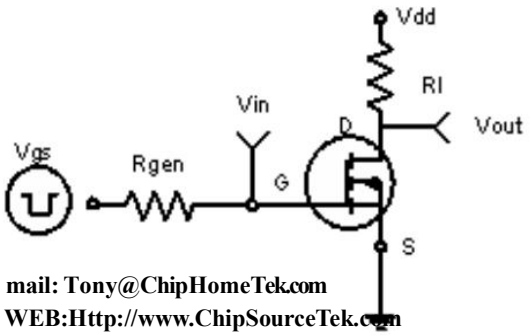


Figure 1:Switching Test Circuit

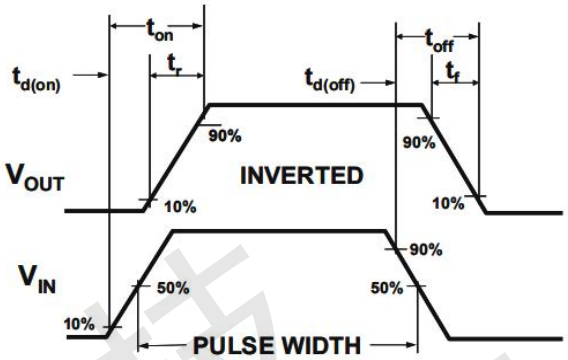


Figure 2:Switching Waveforms

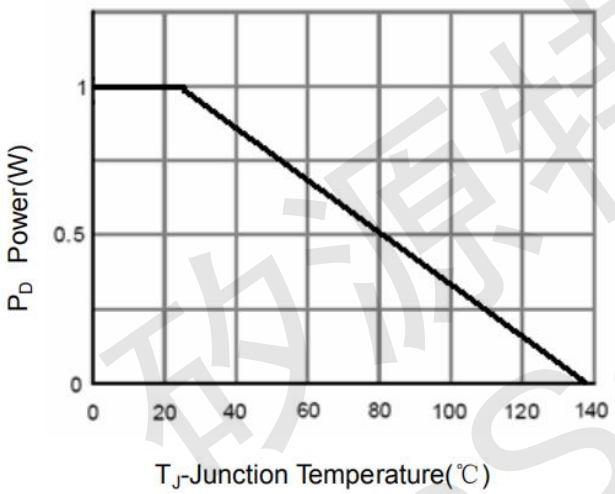


Figure 3 Power Dissipation

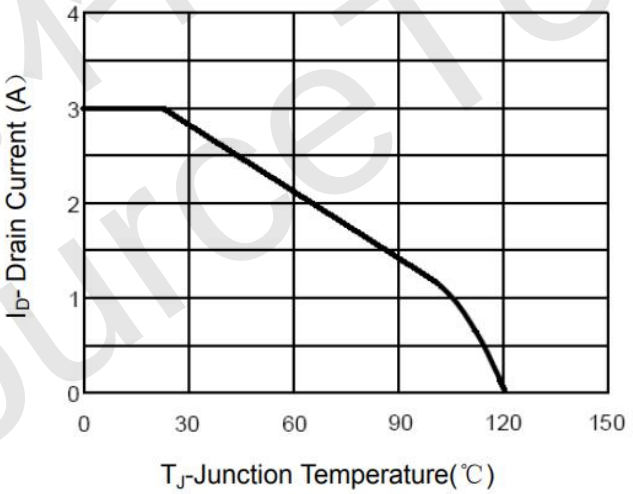


Figure 4 Drain Current

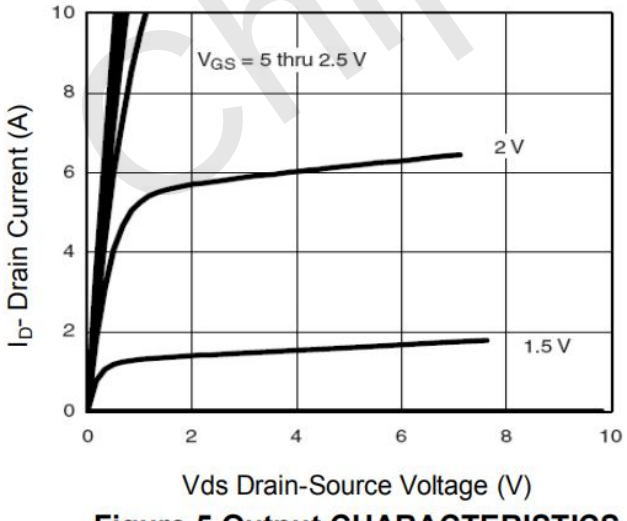


Figure 5 Output CHARACTERISTICS

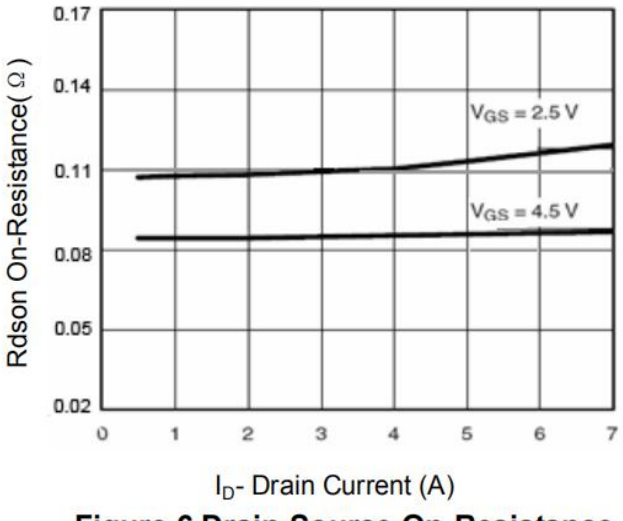


Figure 6 Drain-Source On-Resistance

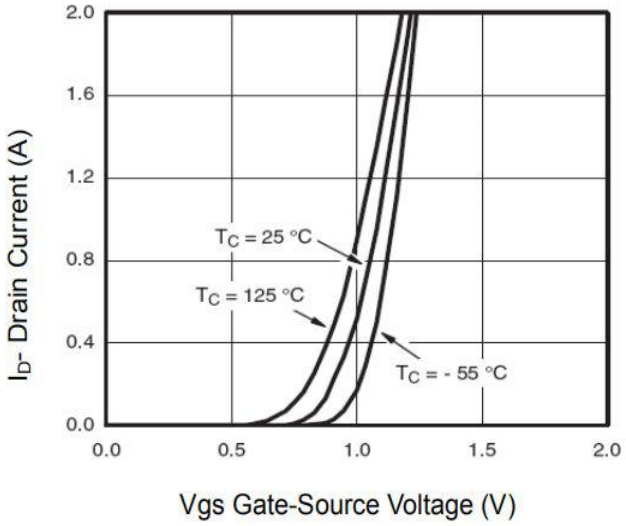


Figure 7 Transfer Characteristics

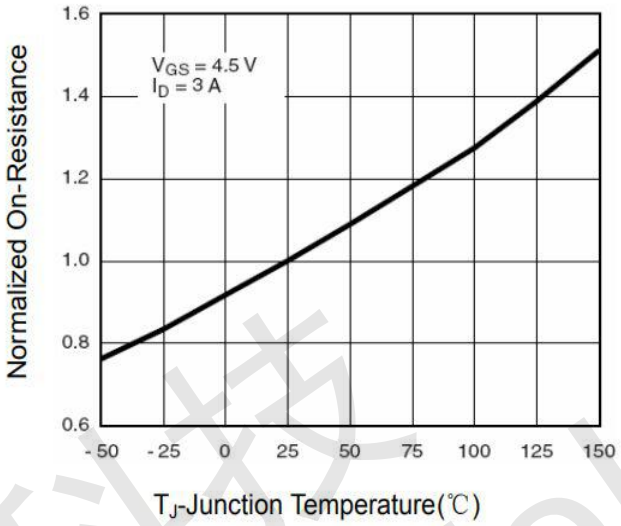


Figure 8 Drain-Source On-Resistance

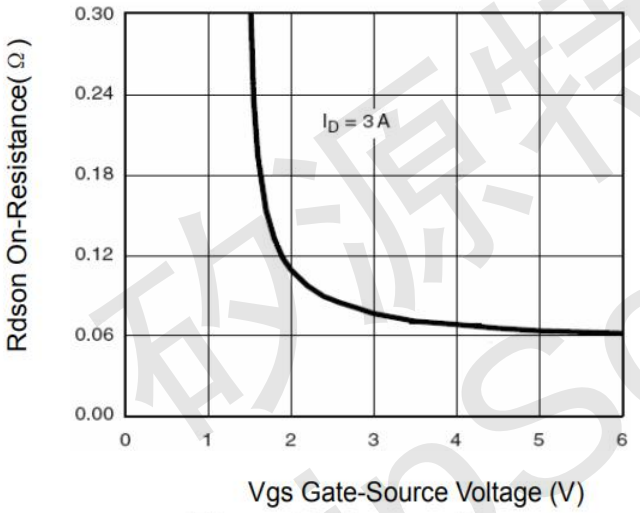


Figure 9 Rdson vs Vgs

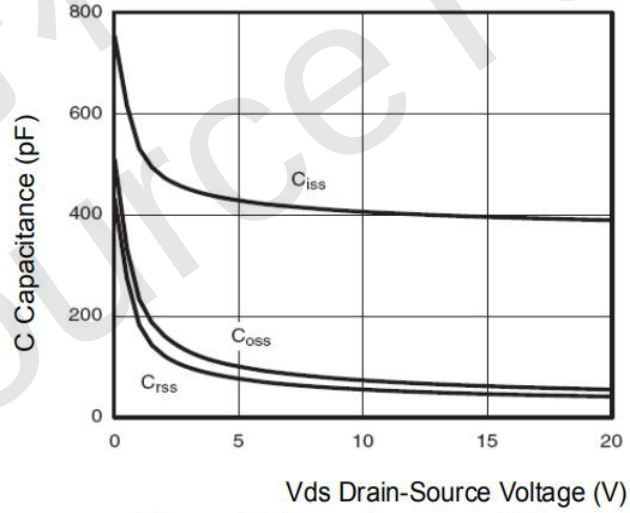


Figure 10 Capacitance vs Vds

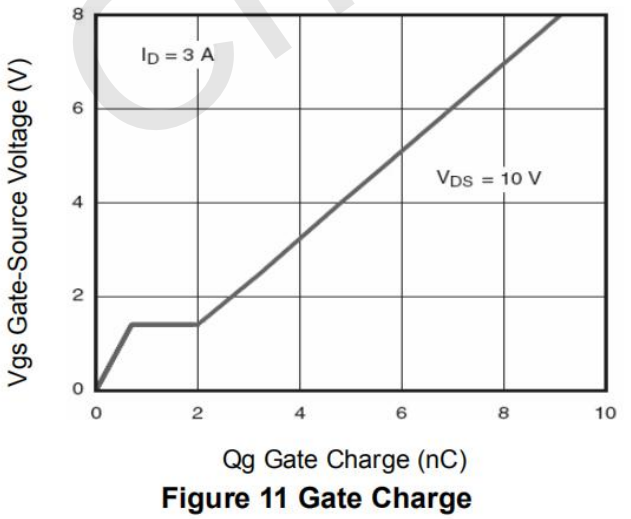


Figure 11 Gate Charge

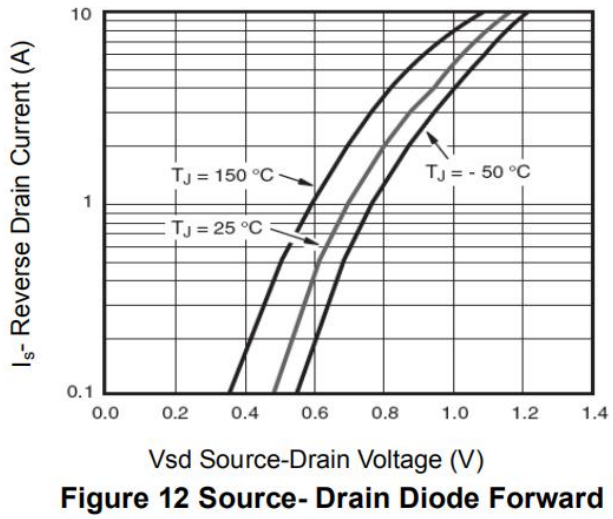


Figure 12 Source- Drain Diode Forward

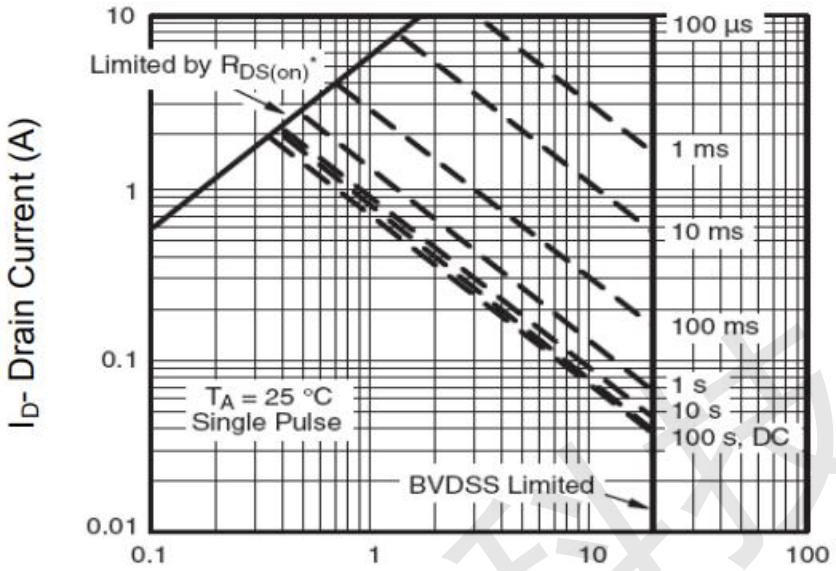


Figure 13 Safe Operation Area

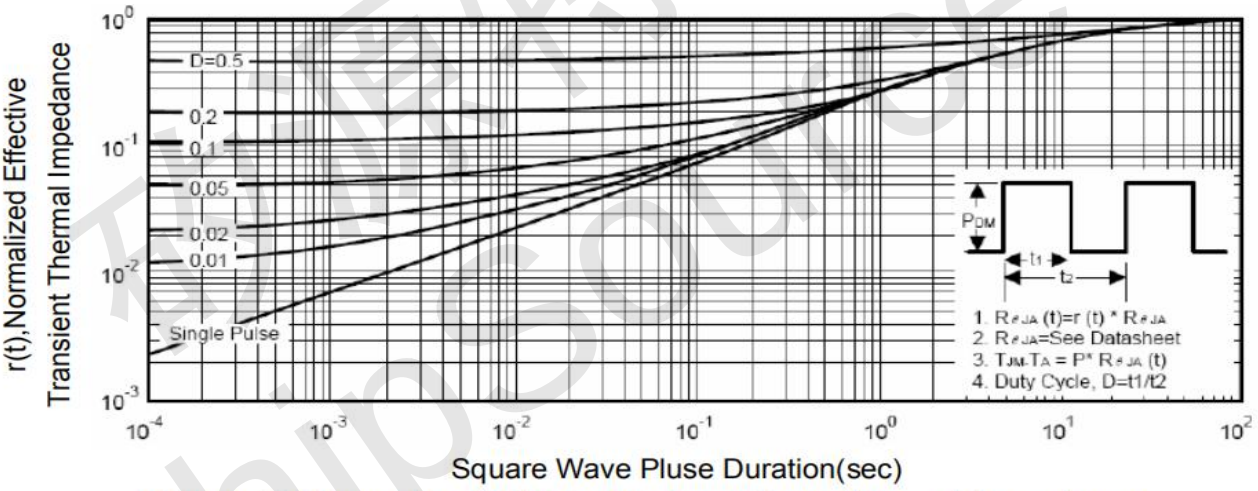
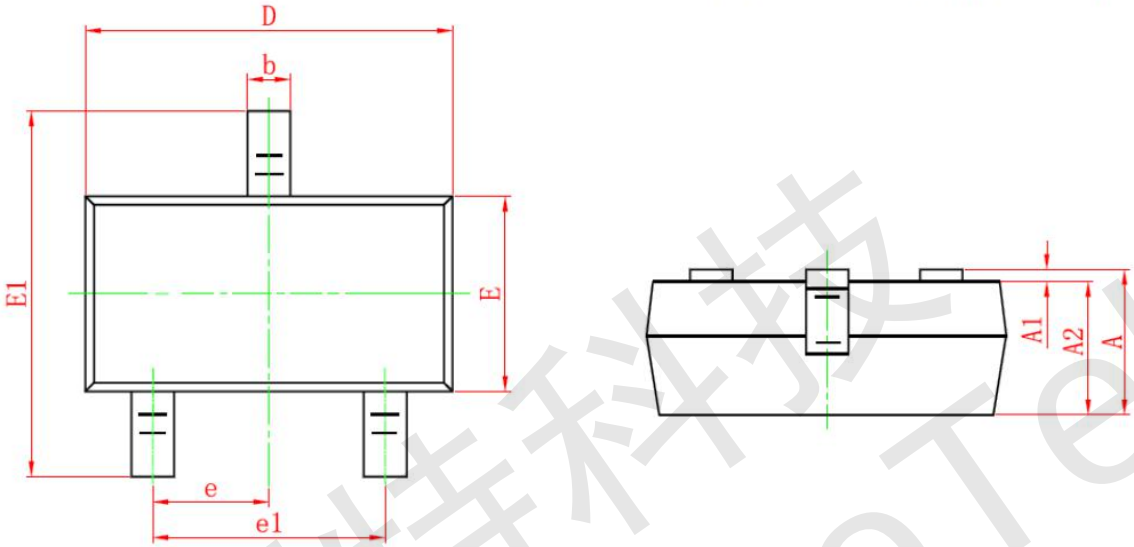


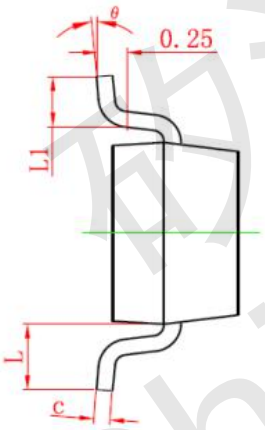
Figure 14 Normalized Maximum Transient Thermal Impedance

Package Information

SOT-23

Dimensions in Millimeters (UNIT:mm)





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°

NOTES

1. All dimensions are in millimeters.
2. Tolerance ±0.10mm (4 mil) unless otherwise specified
3. Package body sizes exclude mold flash and gate burrs. Mold flash at the non-lead sides should be less than 5 mils.
4. Dimension L is measured in gauge plane.
5. Controlling dimension is millimeter, converted inch dimensions are not necessarily exact.