

N-Channel Trench Power MOSFET

General Description

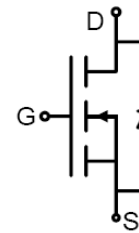
The SI2302 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a battery protection or in other switching application.

Features

- $V_{DS} = 20V, I_D = 2.9A$
 $R_{DS(ON)} < 40m\Omega @ V_{GS} = 4.5V$
 $R_{DS(ON)} < 55m\Omega @ V_{GS} = 2.5V$
 $R_{DS(ON)} < 300m\Omega @ V_{GS} = 1.2V$
- High Power and current handing capability
- Lead free product is acquired
- Surface Mount Package

Application

- Battery protection
- Load switch
- Power management



Schematic Diagram



SOT23 top view

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
2302 or .2301	SI2302	SOT23	Ø180mm	8mm	3000 units

Table 1. Absolute Maximum Ratings ($T_A = 25^\circ C$)

Symbol	Parameter	Value	Unit
V_{DS}	Drain-Source Voltage ($V_{GS} = 0V$)	20	V
V_{GS}	Gate-Source Voltage ($V_{DS} = 0V$)	± 12	V
I_D	Drain Current-Continuous	2.9	A
$I_{DM (pluse)}$	Drain Current-Continuous@ Current-Pulsed (Note 1)	10	A
P_D	Maximum Power Dissipation	1	W
T_J, T_{STG}	Operating Junction and Storage Temperature Range	-55 To 150	$^\circ C$

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

Table 2. Thermal Characteristic

Symbol	Parameter	Value	Unit
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	125	$^\circ C/W$

Table 3. Electrical Characteristics (T_A=25°C unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
On/Off States						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V I _D =250μA	20	22		V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =20V, V _{GS} =0V			1	μA
I _{GSS}	Gate-Body Leakage Current	V _{GS} =±12V, V _{DS} =0V			±100	nA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250μA	0.5	0.85	1.2	V
g _{FS}	Forward Transconductance	V _{DS} =5V, I _D =2.9A	4	8		S
R _{DS(ON)}	Drain-Source On-State Resistance	V _{GS} =4.5V, I _D =2.9A		26	40	mΩ
		V _{GS} =2.5V, I _D =2A		36	55	mΩ
		V _{GS} =1.2V, I _D =0.25A		150	350	mΩ
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} =10V, V _{GS} =0V, f=1.0MHz		480		pF
C _{oss}	Output Capacitance			86		pF
C _{rss}	Reverse Transfer Capacitance			56		pF
Switching Times						
t _{d(on)}	Turn-on Delay Time	V _{DD} =10V, I _D =2.9A, R _L =2.8Ω V _{GS} =4.5V, R _G =6Ω		11		nS
t _r	Turn-on Rise Time			52		nS
t _{d(off)}	Turn-Off Delay Time			17		nS
t _f	Turn-Off Fall Time			10		nS
Q _g	Total Gate Charge	V _{DS} =10V, I _D =2.9A, V _{GS} =4.5V		4		nC
Q _{gs}	Gate-Source Charge			0.7		nC
Q _{gd}	Gate-Drain Charge			1.2		nC
Source-Drain Diode Characteristics						
I _{SD}	Source-Drain Current(Body Diode)				2.9	A
V _{SD}	Forward on Voltage ^(Note 1)	V _{GS} =0V, I _S =2.9A		0.75	1	V

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

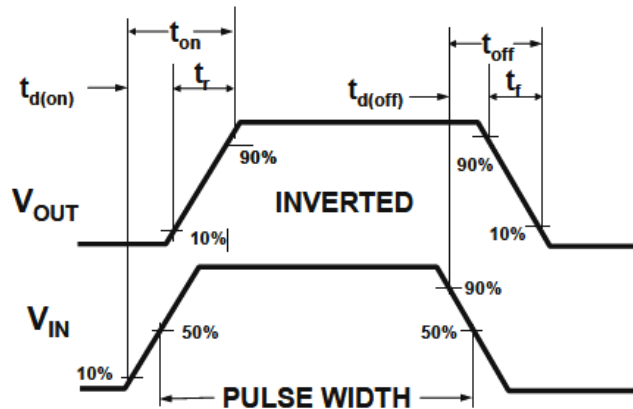
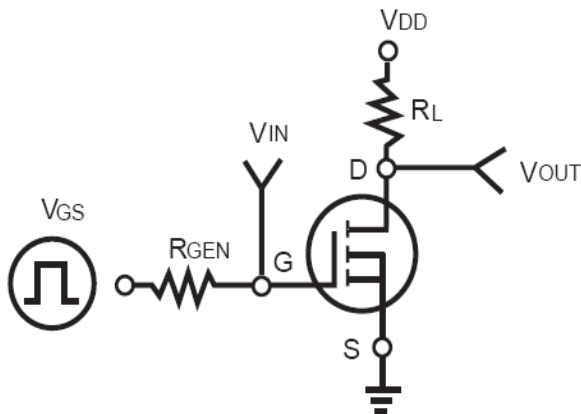
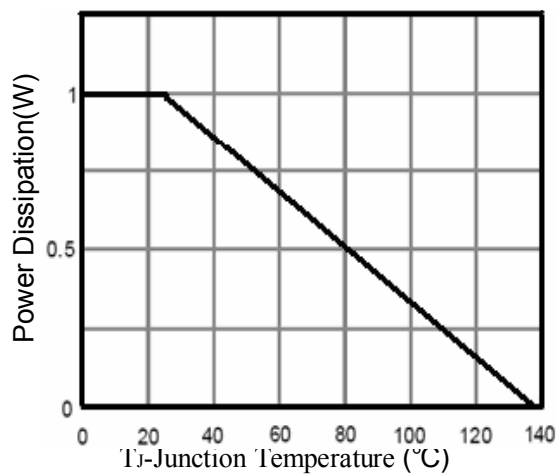
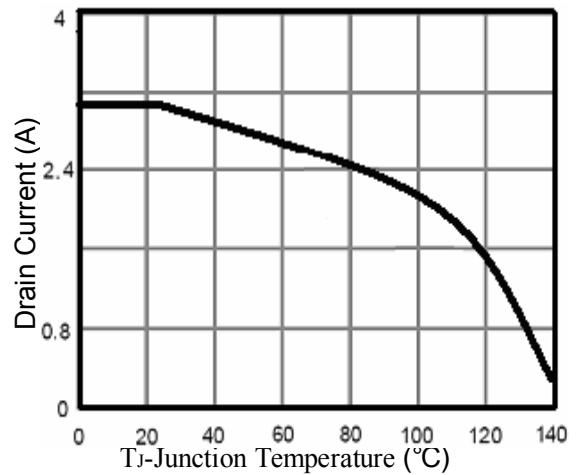
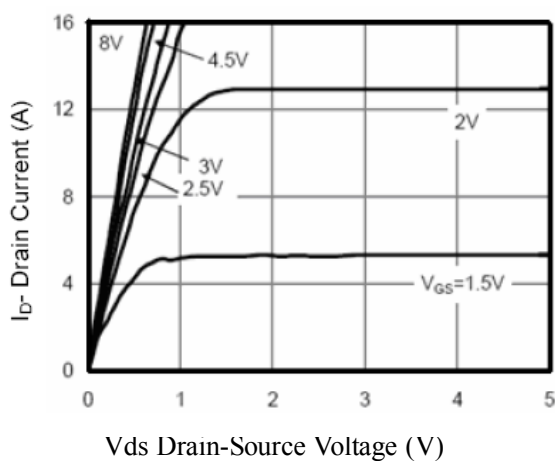
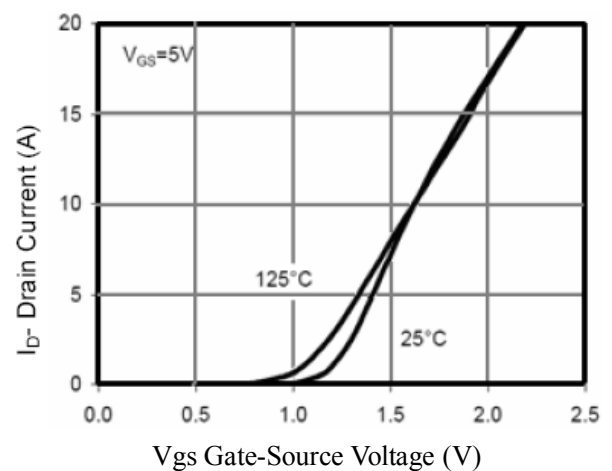
Switch Time Test Circuit and Switching Waveforms:

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS (Curves)
Figure1. Power Dissipation

Figure2. Drain Current

Figure3. Output Characteristics

Figure4. Transfer Characteristics


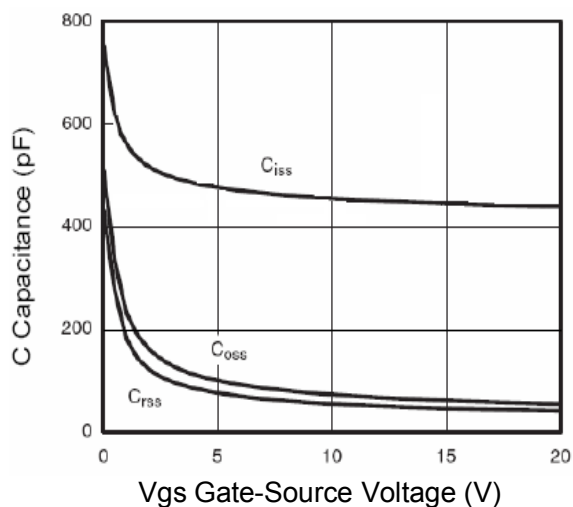
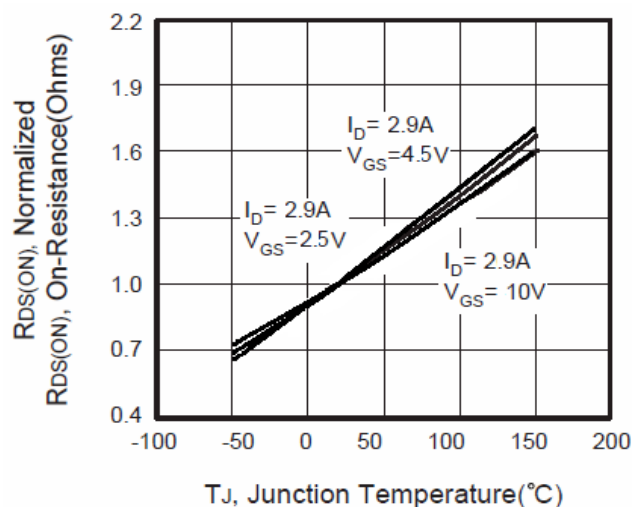
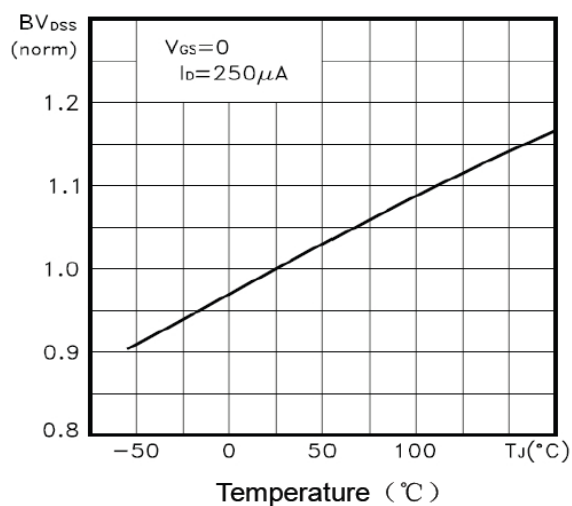
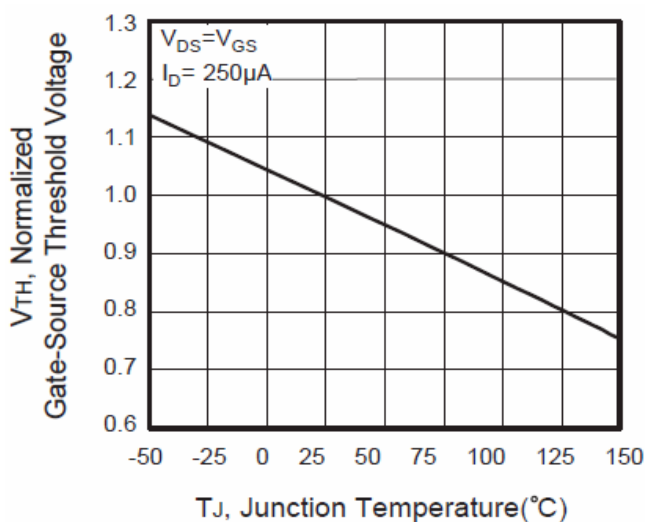
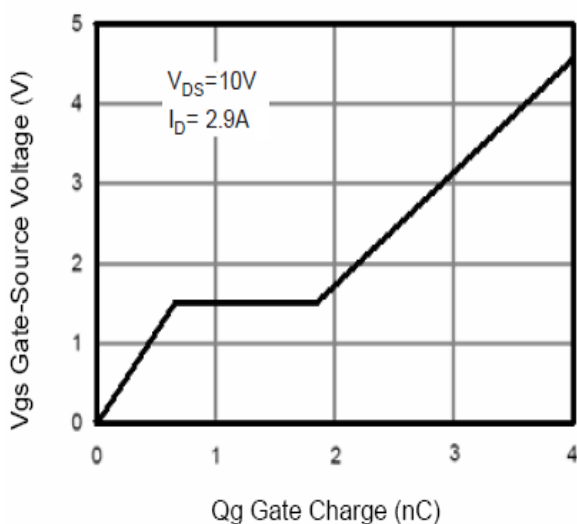
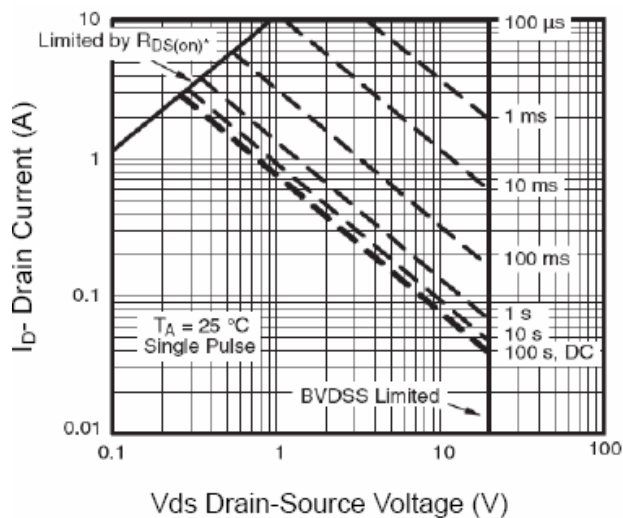
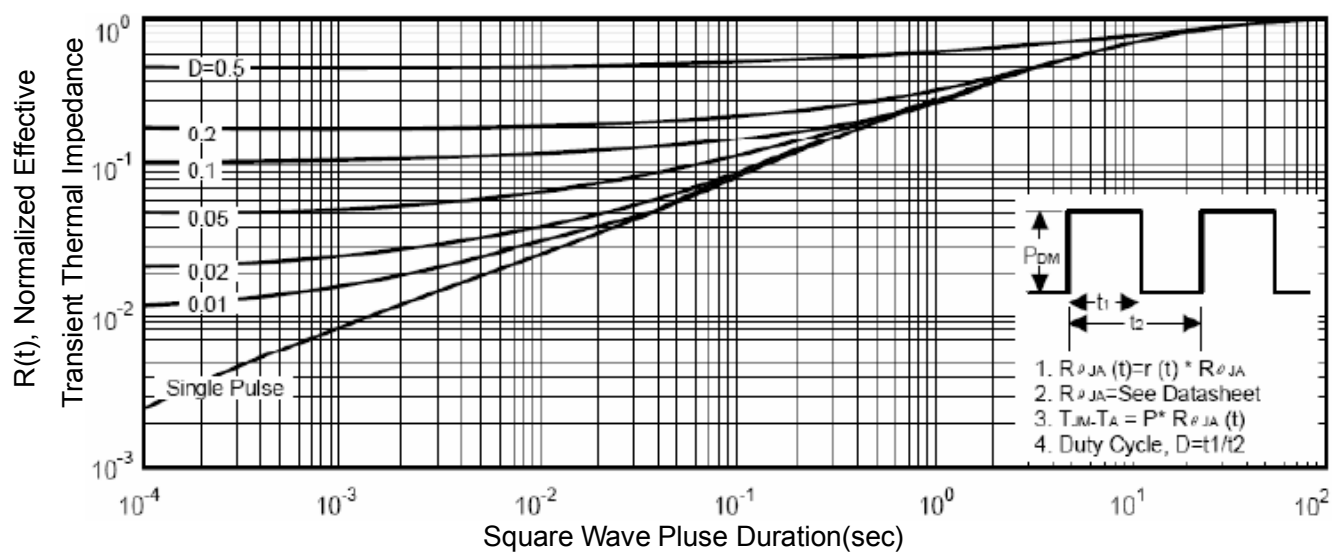
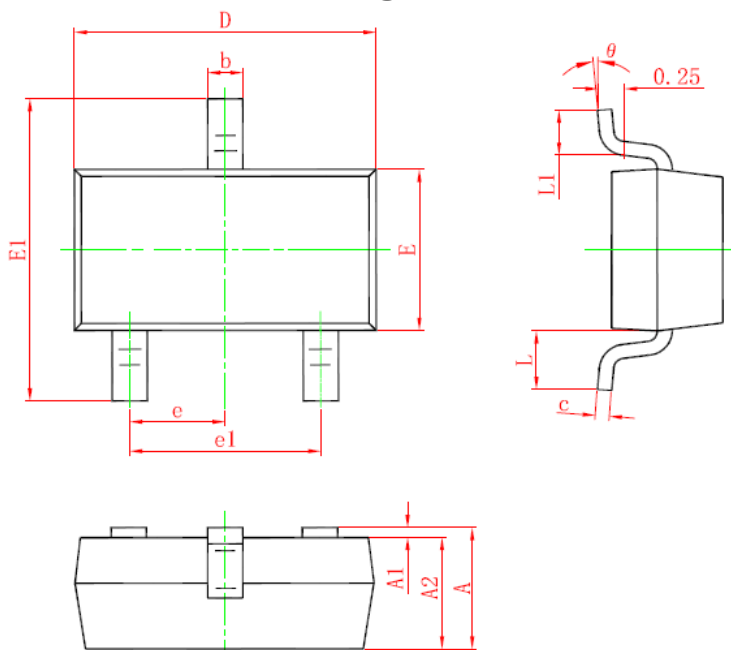
Figure5. Capacitance

Figure6. $R_{DS(ON)}$ vs Junction Temperature

Figure7. Max BV_{DSS} vs Junction Temperature

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

Figure9. Gate Charge Waveforms

Figure10. Maximum Safe Operating Area


Figure11. Normalized Maximum Transient Thermal Impedance



SOT23 Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.150	0.035	0.045
A1	0.000	0.100	0.000	0.004
A2	0.900	1.050	0.035	0.041
b	0.300	0.500	0.012	0.020
c	0.080	0.150	0.003	0.006
D	2.800	3.000	0.110	0.118
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950 TYP.		0.037 TYP.	
e1	1.800	2.000	0.071	0.079
L	0.550 REF.		0.022 REF.	
L1	0.300	0.500	0.012	0.020
θ	0°	8°	0°	8°

Carrier Dimensions

PKG TYPE	W	P	E	F	D	D1	Po	Po10	P2
SOT23	8.00	4.00	1.75	3.50	1.50	1.00	4.00	40.00	2.00
Tolerance	+0.3/-0.1	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1	±0.2	±0.05

A0	B0	K0	T
3.15	2.77	1.22	0.20
±0.1	±0.1	±0.1	±0.02

