

Description

The SI2301 is the high cell density trench P-ch MOSFETs, which provides excellent RDSON and efficiency for most of the small power switching and load switch applications.

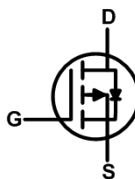
The SI2301 meet the RoHS and Green Product requirement with full function reliability approved.

Features

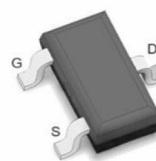
Green Device Available
Super Low Gate Charge
Excellent Cdv/dt effect decline
Advanced high cell density Trench technology

V_{DS} -20 V
 I_D -3 A
 $R_{DS(ON)}$ 55m Ω

A1SHB



Schematic Diagram



SOT-23-3L top view

MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	-20	V
V_{GS}	Gate-Source Voltage	± 12	V
$I_D @ T_A = 25^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ -4.5\text{V}^1$	-3	A
$I_D @ T_A = 70^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ -4.5\text{V}^1$	-2.4	A
I_{DM}	Pulsed Drain Current ²	-12	A
$P_D @ T_A = 25^\circ\text{C}$	Total Power Dissipation ³	1	W
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ\text{C}$
T_J	Operating Junction Temperature Range	-55 to 150	$^\circ\text{C}$

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-ambient ¹	---	125	$^\circ\text{C/W}$
$R_{\theta JC}$	Thermal Resistance Junction-Case ¹	---	---	$^\circ\text{C/W}$

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

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
Off Characteristic						
V _{(BR)DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D = -250μA	-20	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = -20V, V _{GS} =0V,	-	-	-1	μA
I _{GSS}	Gate to Body Leakage Current	V _{DS} =0V, V _{GS} = ±12V	-	-	±100	nA
On Characteristics						
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D = -250μA	-0.5	-0.7	-1.0	V
R _{DS(on)}	Static Drain-Source on-Resistance note2	V _{GS} = -4.5V, I _D = -3A	-	55	80	mΩ
		V _{GS} = -2.5V, I _D = -2A	-	80	100	
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} = -10V, V _{GS} =0V, f=1.0MHz	-	503	-	pF
C _{oss}	Output Capacitance		-	67	-	pF
C _{rss}	Reverse Transfer Capacitance		-	58	-	pF
Q _g	Total Gate Charge	V _{DS} = -10V, I _D = -2A, V _{GS} = -4.5V	-	4.1	-	nC
Q _{gs}	Gate-Source Charge		-	0.8	-	nC
Q _{gd}	Gate-Drain(“Miller”) Charge		-	1.1	-	nC
Switching Characteristics						
t _{d(on)}	Turn-on Delay Time	V _{DD} = -10V, I _D = -3A, R _G =1Ω, V _{GEN} = -4.5V, R _L =1.2Ω	-	11	-	ns
t _r	Turn-on Rise Time		-	52	-	ns
t _{d(off)}	Turn-off Delay Time		-	16	-	ns
t _f	Turn-off Fall Time		-	10	-	ns
Drain-Source Diode Characteristics and Maximum Ratings						
I _S	Maximum Continuous Drain to Source Diode Forward Current		-	-	-3	A
I _{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	-12	A
V _{SD}	Drain to Source Diode Forward Voltage	V _{GS} =0V, I _S = -3A	-	-	-1.2	V

Notes:1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature

2. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$

RATING AND CHARACTERISTIC CURVES

Figure 1: Output Characteristics

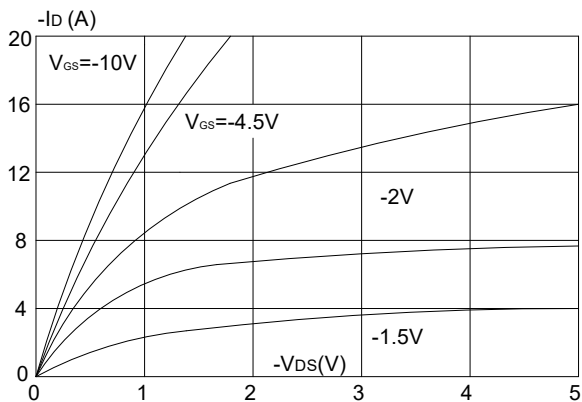


Figure 2: Typical Transfer Characteristics

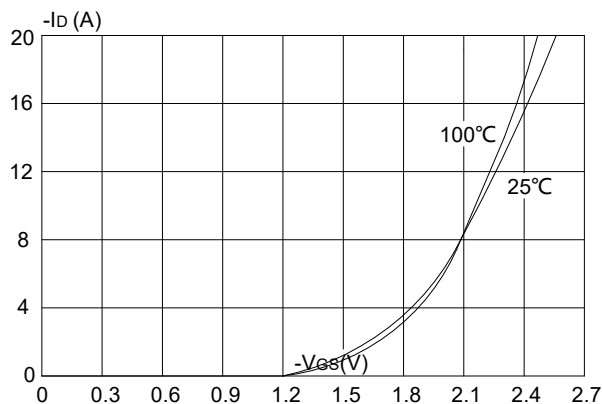


Figure 3: On-resistance vs. Drain Current

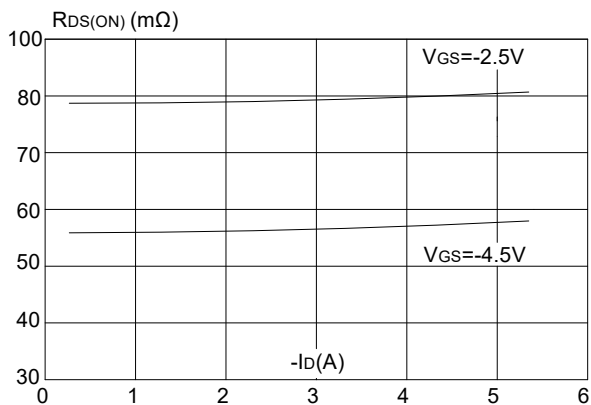


Figure 4: Body Diode Characteristics

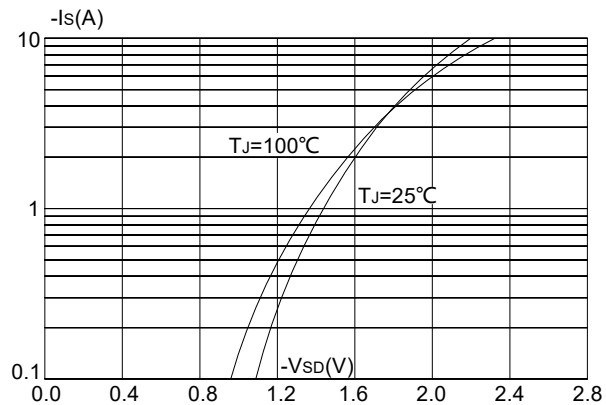


Figure 5: Gate Charge Characteristics

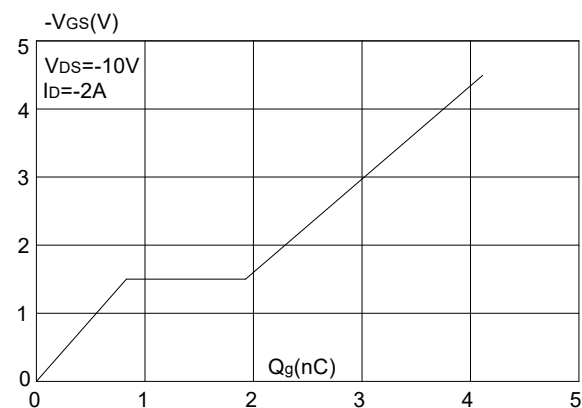
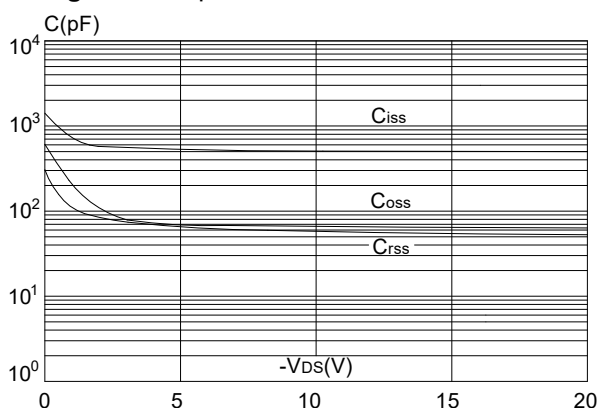


Figure 6: Capacitance Characteristics



RATING AND CHARACTERISTIC CURVES

Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

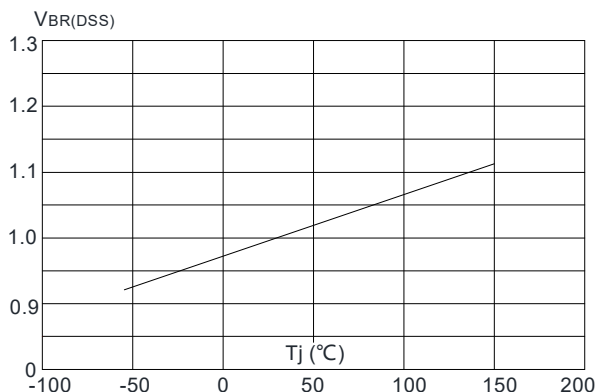


Figure 8: Normalized on Resistance vs. Junction Temperature

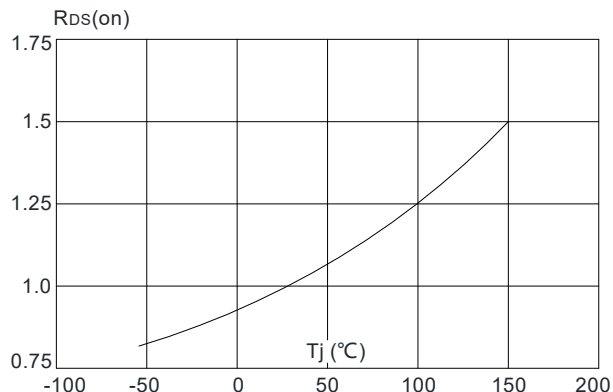


Figure 9: Maximum Safe Operating Area

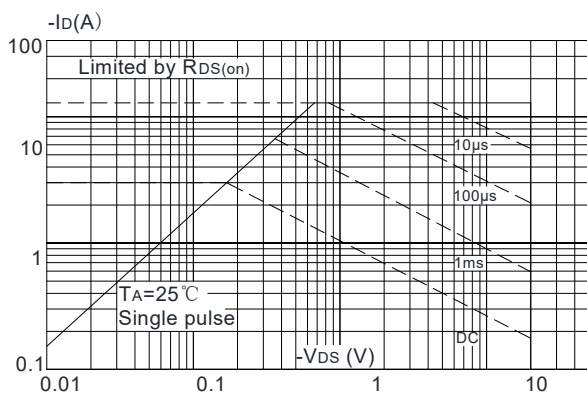


Figure 10: Maximum Continuous Drain Current vs. Ambient Temperature

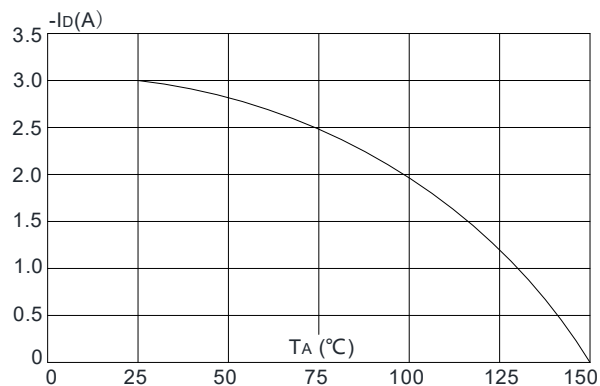
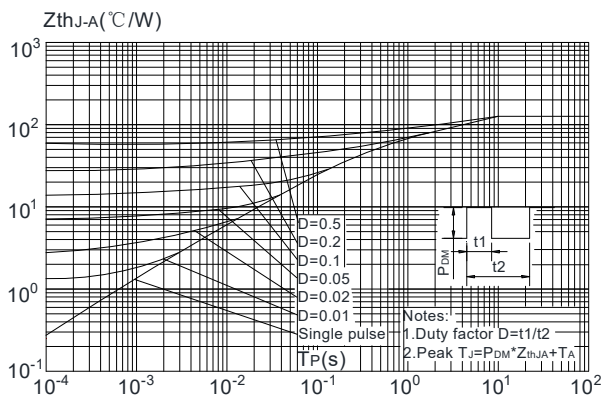
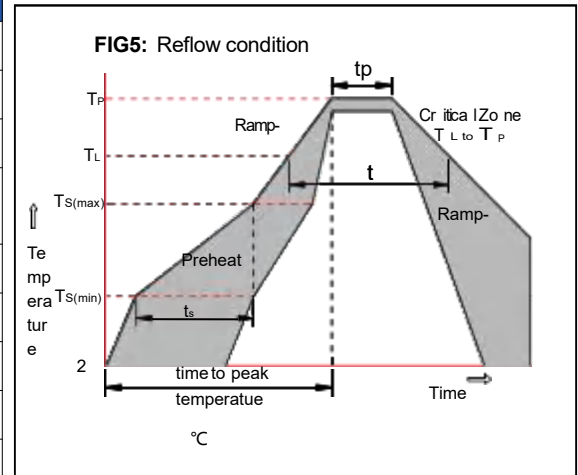


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Ambient



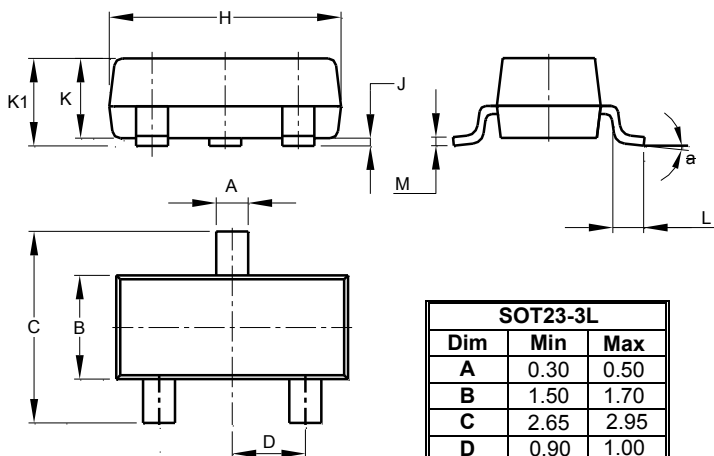
Soldering parameters

Reflow Condition		Pb-Free assembly (see as below)
Pre Heat	-Temperature Min ($T_{s(min)}$)	+150 °C
	-Temperature Max($T_{s(max)}$)	+200 °C
	-Time (Min to Max) (ts)	60-180 secs.
Average ramp up rate (Liquid us Temp (T_L) to peak)		3 °C/sec. Max
$T_{s(max)}$ to T_L - Ramp-up Rate		3 °C/sec. Max
Reflow	-Temperature(T_L)(Liquid us)	+217 °C
	-Temperature(t_L)	60-150 secs.
Peak Temp (T_P)		+260(+0/-5) °C
Time within 5 °C of actual Peak Temp (t_P)		30 secs. Max
Ramp-down Rate		6 °C/sec. Max
Time 25 °C to Peak Temp (T_P)		8 min. Max
Do not exceed		+260 °C

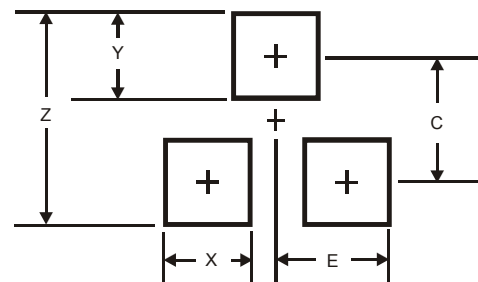


Package Dimensions & Suggested Pad Layout

SOT23-3L

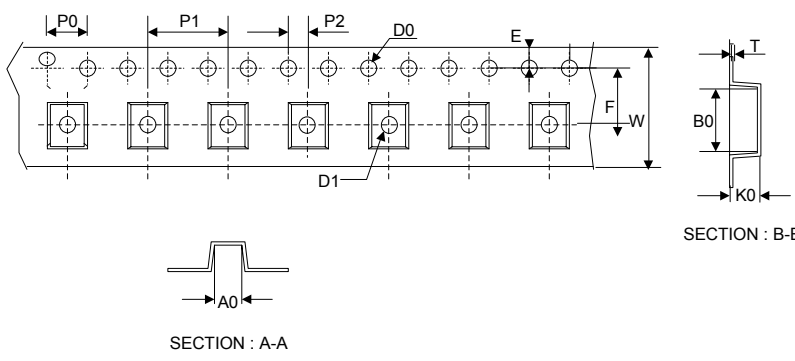
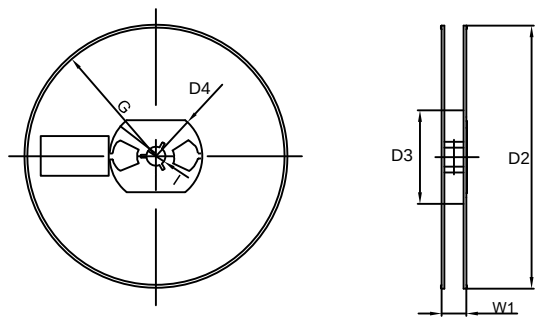


SOT23-3L		
Dim	Min	Max
A	0.30	0.50
B	1.50	1.70
C	2.65	2.95
D	0.90	1.00
H	2.82	3.02
J		0.10
K	1.05	1.15
K1	1.05	1.25
L	0.30	0.60
M	0.10	0.20
a	0°	8°
All Dimensions in mm		



Dimensions	SOT23-3L
Z	3.3
X	0.9
Y	1.0
C	2.3
E	1.40

Tape & reel specification

Tape 	<table> <tr> <th>Symbol</th><th>Dimension (mm)</th></tr> <tr><td>P0</td><td>4.00±0.20</td></tr> <tr><td>P1</td><td>4.00±0.20</td></tr> <tr><td>P2</td><td>2.00±0.20</td></tr> <tr><td>D0</td><td>1.55±0.20</td></tr> <tr><td>D1</td><td>1.05±0.20</td></tr> <tr><td>E</td><td>1.55±0.20</td></tr> <tr><td>F</td><td>3.60±0.20</td></tr> <tr><td>W</td><td>8.00±0.20</td></tr> <tr><td>A0</td><td>3.80±0.20</td></tr> <tr><td>B0</td><td>3.50±0.20</td></tr> <tr><td>K0</td><td>1.55±0.20</td></tr> <tr><td>T</td><td>0.25±0.15</td></tr> </table>	Symbol	Dimension (mm)	P0	4.00±0.20	P1	4.00±0.20	P2	2.00±0.20	D0	1.55±0.20	D1	1.05±0.20	E	1.55±0.20	F	3.60±0.20	W	8.00±0.20	A0	3.80±0.20	B0	3.50±0.20	K0	1.55±0.20	T	0.25±0.15
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7" Reel 	<table> <tr><td>D2</td><td>178.0±5.0</td></tr> <tr><td>D3</td><td>55Min.</td></tr> <tr><td>D4</td><td>R24.0±3.0</td></tr> <tr><td>G</td><td>R82.0±3.0</td></tr> <tr><td>I</td><td>13.0±2.0</td></tr> <tr><td>W1</td><td>11.0±3.0</td></tr> <tr><td colspan="2">Quantity: 3000PCS</td></tr> </table>	D2	178.0±5.0	D3	55Min.	D4	R24.0±3.0	G	R82.0±3.0	I	13.0±2.0	W1	11.0±3.0	Quantity: 3000PCS													
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