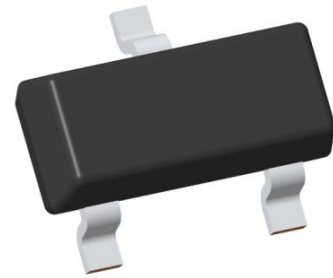


General Description

V(BR)DSS	R _{DS(on)} MAX	I _D Max.
-20V	48m Ω @-4.5V	-4A
	65m Ω @-2.5V	

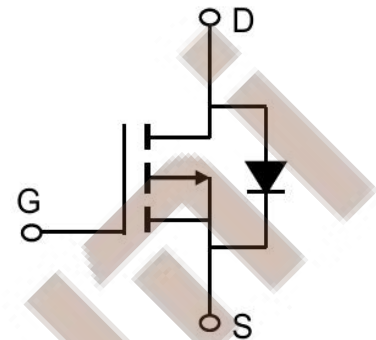


Features

- Lead free product is acquired
- Surface mount package
- Moisture Sensitivity Level 3

Mechanical Data

- SOT-23 Small Outline Plastic Package.
- Epoxy UL: 94V-0.
- Mounting Position: Any.



Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
2301A	SOT-23	S1	3000

Absolute Maximum Ratings (Ta=25°C unless otherwise noted)

Parameter	Symbols	Value	Units
Drain-Source Voltage	V _{DS}	-20	V
Gate-Source Voltage	V _{GS}	± 12	V
Continuous Drain Current	I _D	-4	A
Pulsed Drain Current(Note1)	I _{DM}	-16	
Power Dissipation	P _D	900	mW
Junction Temperature	T _j	-55-+150	°C
Storage Temperature	T _{stg}	-55-+150	°C
Thermal Resistance From Junction to Ambient (Note2)	R _{θJA}	139	°C/W

Electrical Characteristics (Ta=25℃, unless otherwise noted)

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	V(BR)DSS	VGS=0V, ID=-250uA	-20			V
Gate-body Leakage	IGSS	VDS=0V, VGS=±12V			±100	nA
Zero Gate Voltage Drain current	IDSS	VDS=-20V, VGS=0V			-1	uA
On Characteristics						
Gate-Threshold voltage	V GS (th)	VDS=VGS, ID=-250uA	-0.4	-0.62	-1.0	V
Drain-Source On-Resistance(Note3)	RDS(ON)	VGS=-4.5V, ID=-3.8A		36	48	mΩ
		VGS=-2.5V, ID=-3A		50	65	
Dynamic Characteristics						
Input capacitance	Ciss	VDS=-10V, VGS=0V,f=1MHz		430		pF
Output capacitance	Coss			66		
Reverse Transfer capacitance	Crss			52		
Total gate charge	Qg	VGS=0 to -4.5V, VDS=-10V, ID=-3A		4.3		nC
Gate-source charge	Qgs			0.8		
Gate-drain charge	Qgd			1.1		
Switching Characteristics						
Turn-on Time	td(on)	VDD=-10V, VGS=-4.5V , ID=-3A,RGEN=1Ω		12		ns
Rise time	tr			54		
Turn-off Time	td(off)			15		
Fall time	tf			9		
Drain-source body diode characteristics						
Continuous source-drain diode current	IS				-4	A
Pulse diode forward current (a)	ISM				-16	
Body diode voltage	VSD	IS=-4A, VGS=0V			1.2	V

Notes :

1. Repetitive Rating:Pulse Width Limited by Maximum Junction Temperature.
2. RθJA is measured with the device mounted on a 1inch² pad of 2oz copper FR4 PCB.
3. Pulse Test: Pulse Width ≤300us, Duty Cycle≤0.5%.

Typical Characteristics

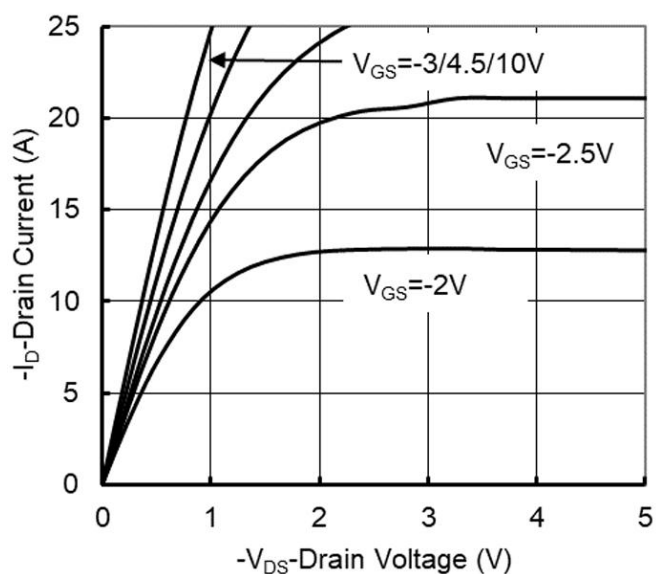


Figure1. Output Characteristics

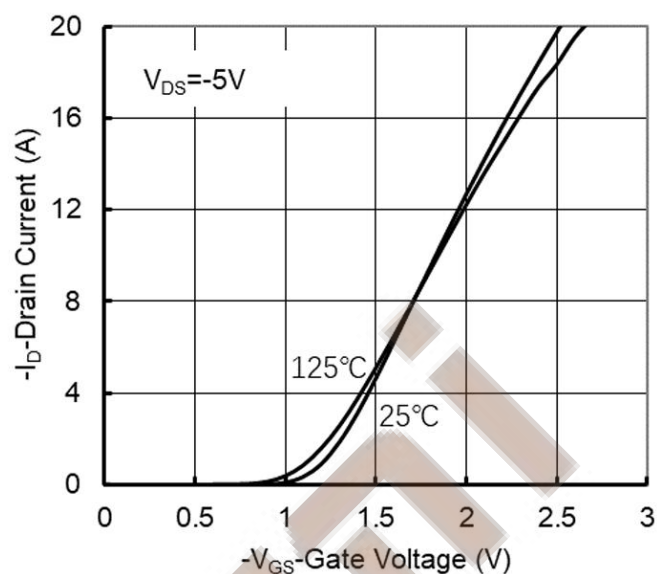


Figure2. Transfer Characteristics

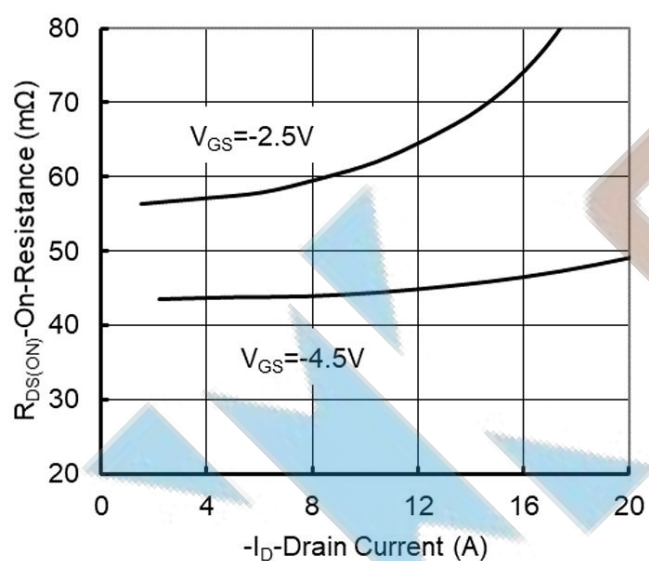


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

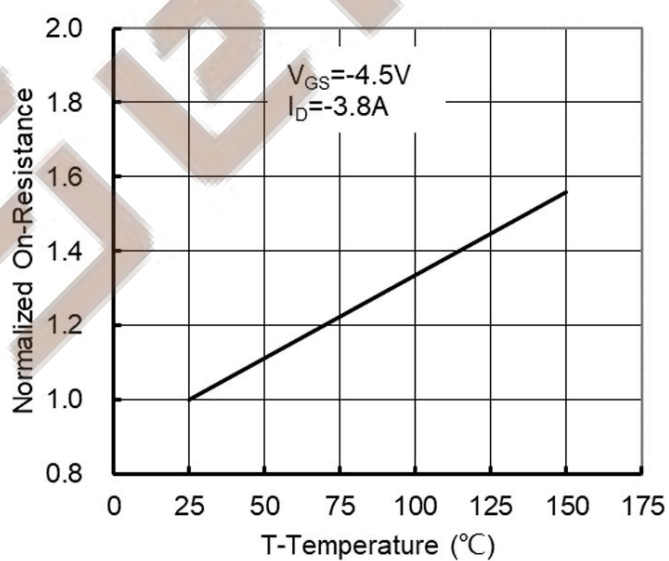
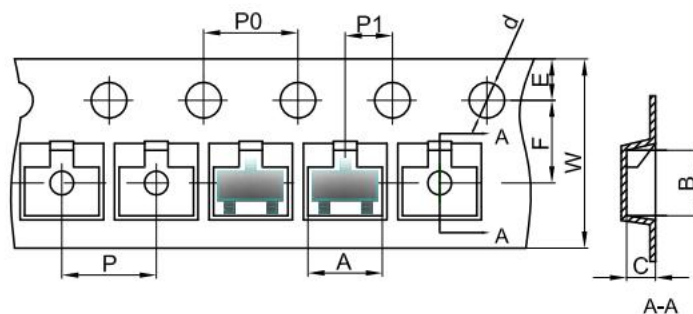


Figure 4: On-Resistance vs. Junction Temperature

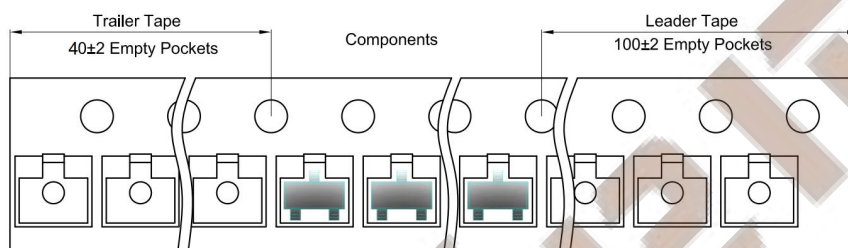
Package Information

Carrier Dimension(mm)

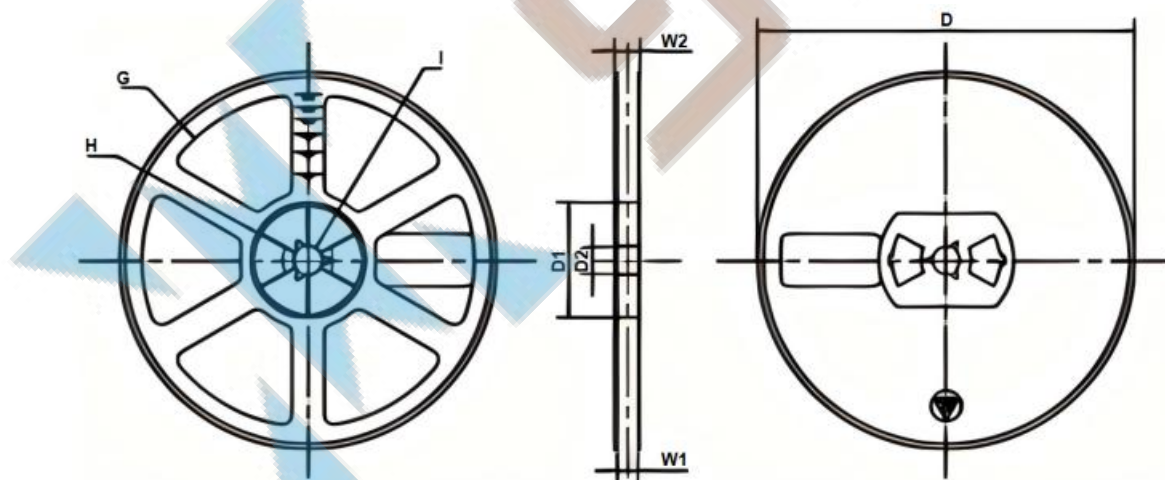


Dimensions are in millimeter

Pkg Type	A0	A1	B0	B1	K0	D0	D1	E	F	P0	P1	P2	10*P0	W	T
SOT-23	3.15	1.09	2.77	2.15	1.22	1.55	1.00	1.75	3.50	4.00	4.00	2.00	40.00	8.00	0.20
(Tolerance)	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1	±0.2	±0.1	±0.03



Reel Dimension(mm)



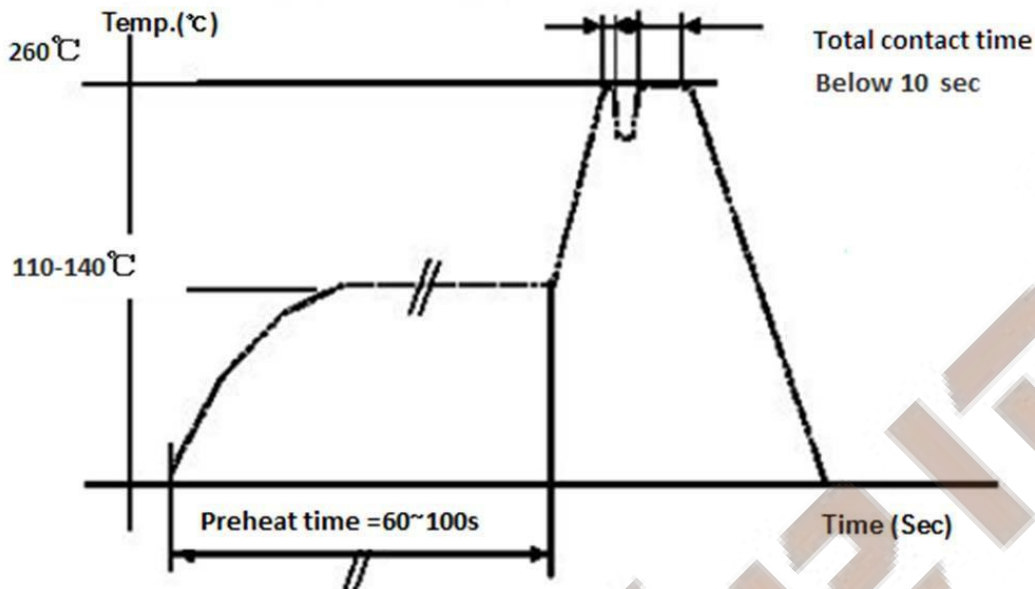
Reel Option	D	D1	D2	G	H	I	W1	W2
7"Dia	Φ178.00	54.40	13.00	R78.00	R25.60	R6.50	9.50	12.30
Tolerance	±2	±1	±1	±1	±1	±1	±1	±1

Package Specifications

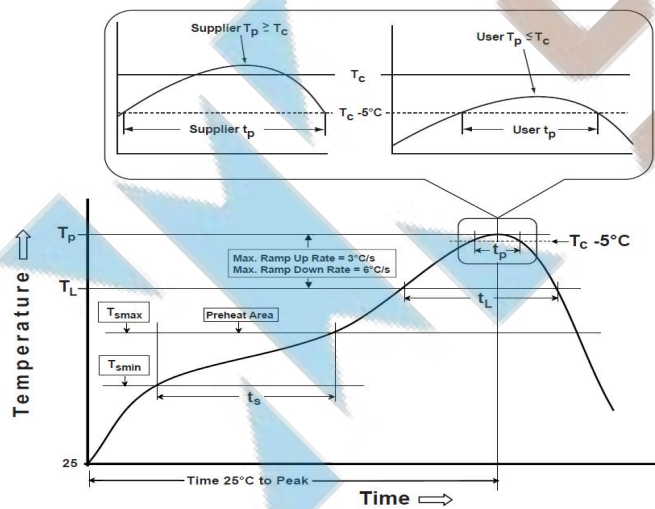
Package	Reel Size	Reel DIA. (mm)	Q'TY/Reel (Kpcs)	Box Size (mm)	QTY/Box (Kpcs)	Carton Size (mm)	Q'TY/Carton (Kpcs)
SOT23	7'	178	3	210*208*203	45	440*400*230	180

Recommended Soldering Profile for Rectifier Diodes (Pb Free)

a) Wave Soldering Profile



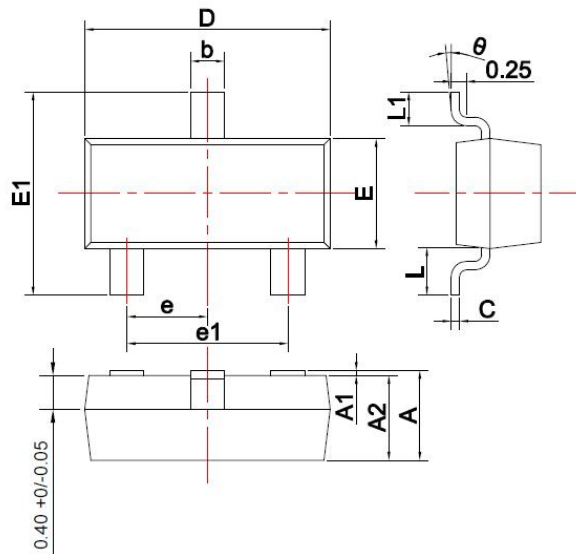
b) Reflow Soldering Profile (Pb Free Application), refer to IPC/JEDEC J-STD-020



Preheat/Soak Temperature Min (T _{min}) Temperature Max (T _{max}) Time (ts) from (T _{min} to T _{max})	50 °C 200 °C 60-120 seconds
Melting Point of Solder (Sn Ag Cu)	217°C
Ramp-up Rate to 217°C(Melting Point of Solder)	3°C/sec
Time at Temp.>217°C (Melting Point of Solder)	60~150 Sec
Peak Temperature	255±5°C
Time within 5°Cbelow Peak Temp.	20~40 Sec
Cooling Rate	6°C/sec (max)
Time from 25°C to Peak Temp.	8min (max)

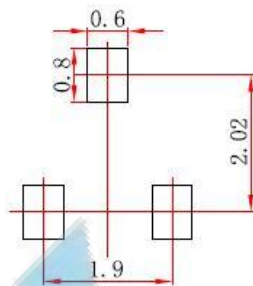
c) Manual Soldering

When using an electric soldering iron for manual soldering, it is recommended that the temperature does not exceed 300°C and the soldering time is less than 10 seconds.

Package Mechanical Data


SYMBOL	DIMENSIONS	
	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°

Unit: mm

Suggested Pad Layout

Note:

1. Controlling dimension: In millimeters.
2. General tolerance: $\pm 0.05\text{mm}$.
3. The pad layout is for reference purposes only.

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