



-20V -3A P-channel MOSFET

Features

- $V_{DS} = -20V$, $I_D = -3A$
- $R_{DS(ON)} < 90m\Omega$ @ $V_{GS} = -4.5V$
 $R_{DS(ON)} < 120m\Omega$ @ $V_{GS} = -2.5V$
- High Power and Current Handling Capability
- Lead Free Product is Acquired
- Surface Mount Package

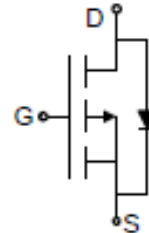
Application

- PWM Applications
- Load Switch
- Power Management

Package



SOT-23



Absolute Maximum Ratings ($T_C = 25^\circ C$ unless otherwise specified)

Symbol	Parameter	Max.	Units	
V_{DSS}	Drain-Source Voltage	-20	V	
V_{GSS}	Gate-Source Voltage	± 12	V	
I_D	Continuous Drain Current	$T_C = 25^\circ C$	-3	A
		$T_C = 100^\circ C$	-2	
I_{DM}	Pulsed Drain Current ^{note1}	-10	A	
P_D	Power Dissipation	$T_C = 25^\circ C$	1	W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	125	$^\circ C/W$	
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +150	$^\circ C$	

**Electrical Characteristics** ($T_C=25^{\circ}\text{C}$ unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
Off Characteristic						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D = -250\mu A$	-20	-24	-	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = -20V, V_{GS} = 0V,$	-	-	-1	μA
I_{GSS}	Gate to Body Leakage Current	$V_{DS} = 0V, V_{GS} = \pm 12V$	-	-	± 100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = -250\mu A$	-0.5	-0.7	-1.0	V
$R_{DS(on)}$	Static Drain-Source on-Resistance <small>note2</small>	$V_{GS} = -4.5V, I_D = -3A$	-	65	90	m Ω
		$V_{GS} = -2.5V, I_D = -2A$	-	89	120	
g_{FS}	Forward Transconductance	$V_{DS} = -5V, I_D = -2A$	5	-	-	S
Dynamic Characteristics						
C_{iss}	Input Capacitance	$V_{DS} = -10V, V_{GS} = 0V,$ $f = 1.0MHz$	-	405	-	pF
C_{oss}	Output Capacitance		-	75	-	pF
C_{rss}	Reverse Transfer Capacitance		-	55	-	pF
Q_g	Total Gate Charge	$V_{DS} = -10V, I_D = -3A,$ $V_{GS} = -2.5V$	-	3.3	12	nC
Q_{gs}	Gate-Source Charge		-	0.7	-	nC
Q_{gd}	Gate-Drain("Miller") Charge		-	1.3	-	nC
Switching Characteristics						
$t_{d(on)}$	Turn-on Delay Time	$V_{DD} = -10V, I_D = -1A,$ $R_{GEN}=10\Omega, V_{GE}=-4.5V,$	-	11	-	ns
t_r	Turn-on Rise Time		-	35	-	ns
$t_{d(off)}$	Turn-off Delay Time		-	30	-	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		-	-	-10	A
V_{SD}	Drain to Source Diode Forward Voltage	$V_{GS} = 0V, I_S = -1.3A$	-	-	-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 $\leq 2\%$



Typical Performance Characteristics

Figure 1: Output Characteristics

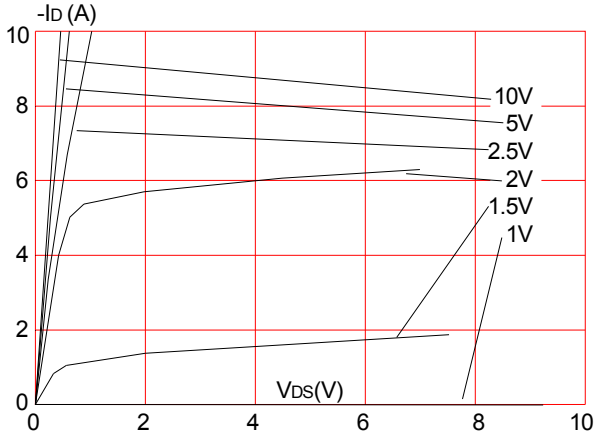


Figure 2: Typical Transfer Characteristics

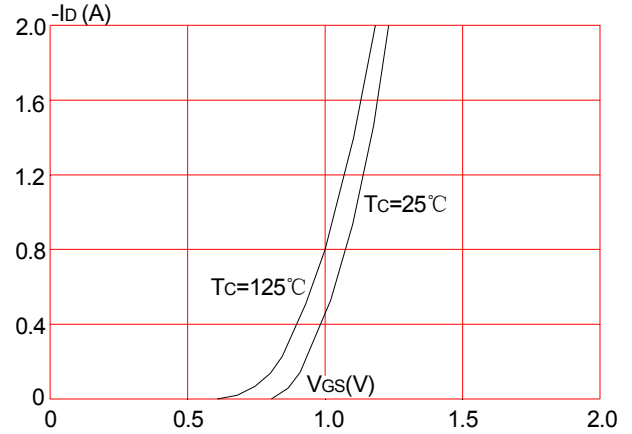


Figure 3: On-resistance vs. Drain Current

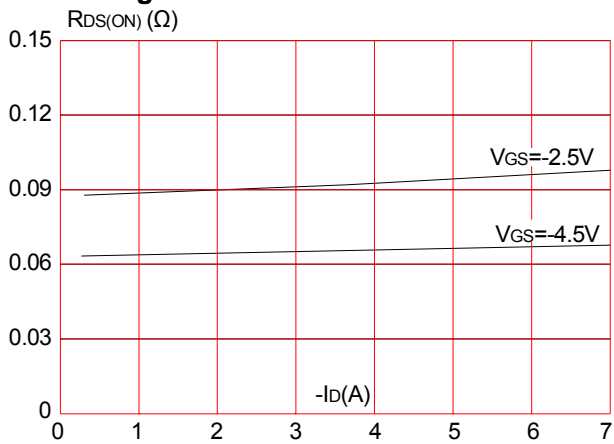


Figure 4: Body Diode Characteristics

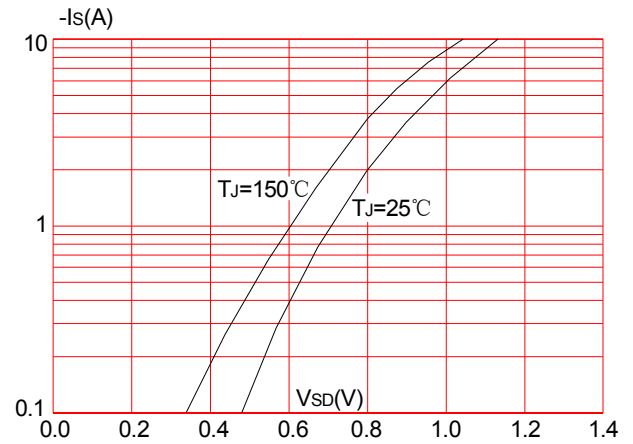


Figure 5: Gate Charge Characteristics

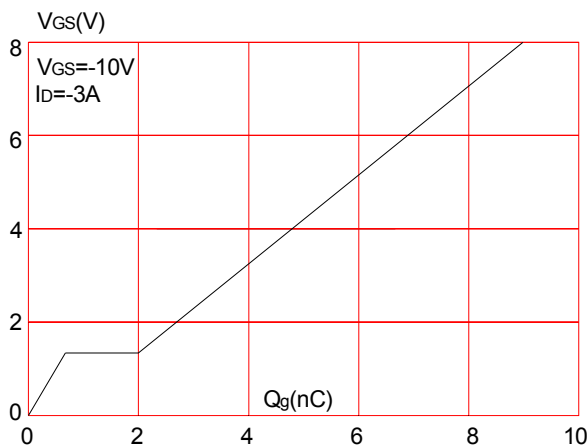


Figure 6: Capacitance Characteristics

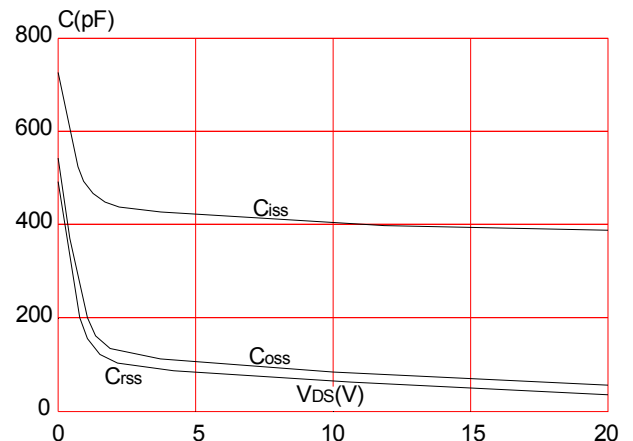




Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

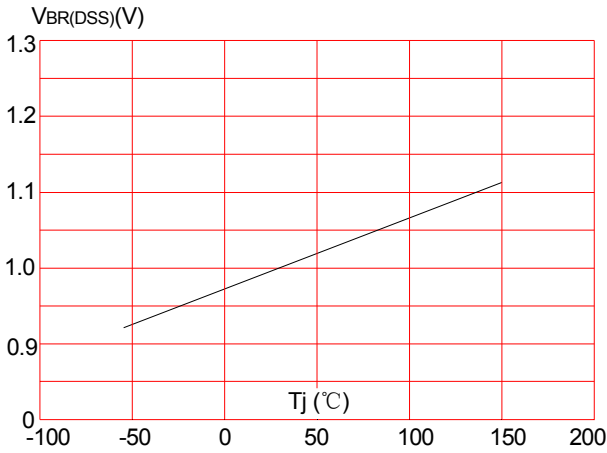


Figure 8: Normalized on Resistance vs. Junction Temperature

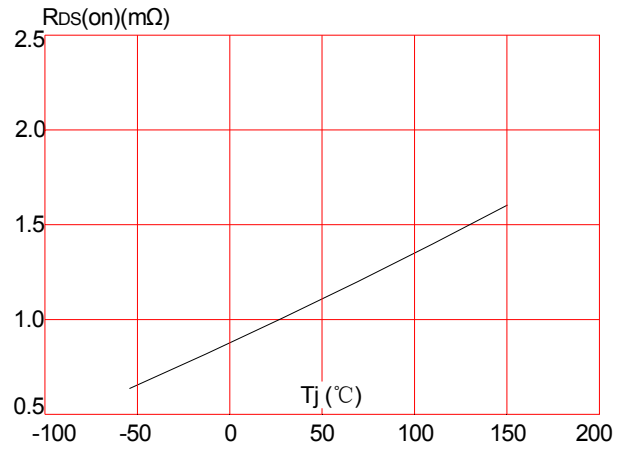


Figure 9: Maximum Safe Operating Area

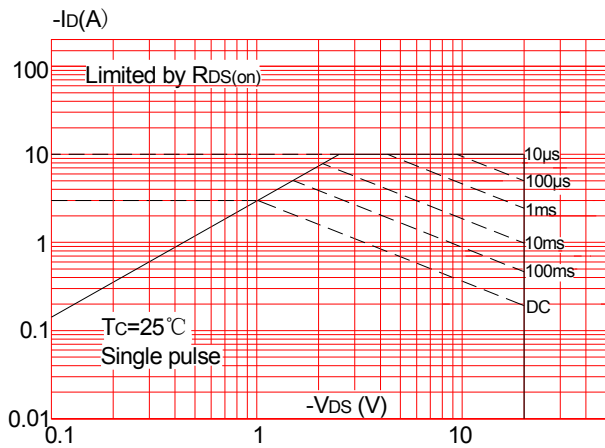


Figure 10: Maximum Continuous Drain Current vs. Case Temperature

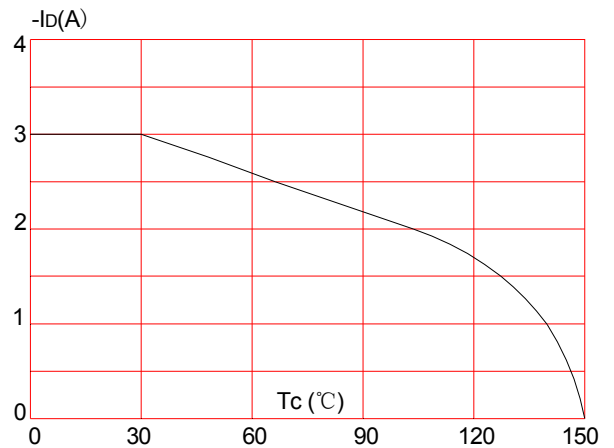
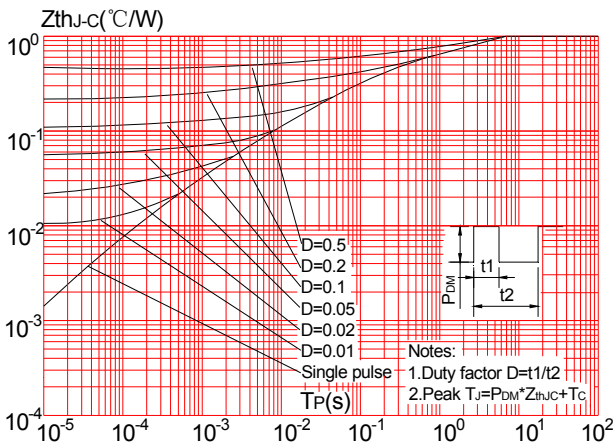


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Case (SOT-23)



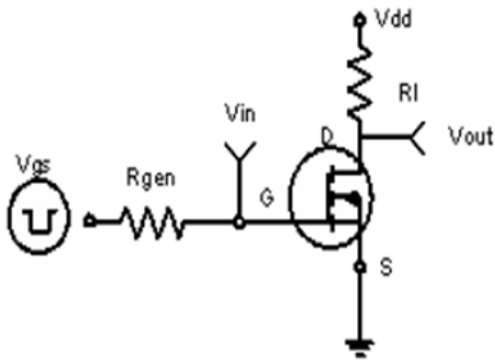


Figure1:Switching Test Circuit

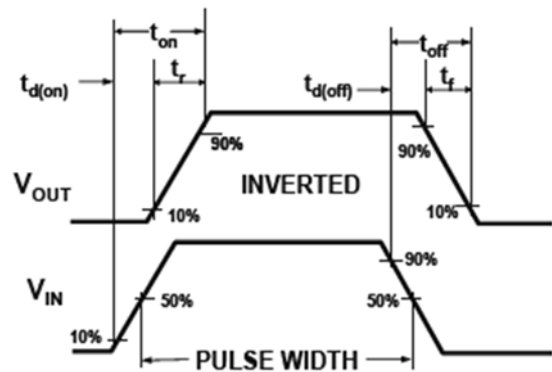
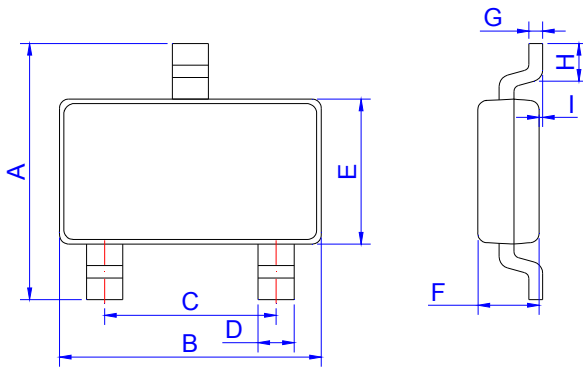


Figure2:Switching Waveforms

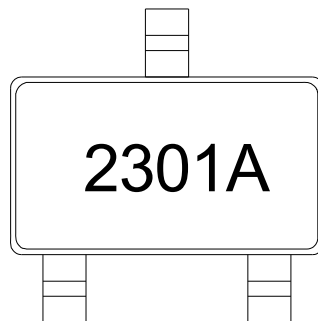
Package Mechanical Data



SOT-23

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.30	2.40	2.50	0.091	0.095	0.098
B	2.80	2.90	3.00	0.110	0.114	0.118
C	1.90 REF			0.075 REF		
D	0.35	0.40	0.45	0.014	0.016	0.018
E	1.20	1.30	1.40	0.047	0.051	0.055
F	0.90	1.00	1.10	0.035	0.039	0.043
G		0.10	0.15		0.004	0.006
H	0.20			0.008		
I	0		0.10	0		0.004

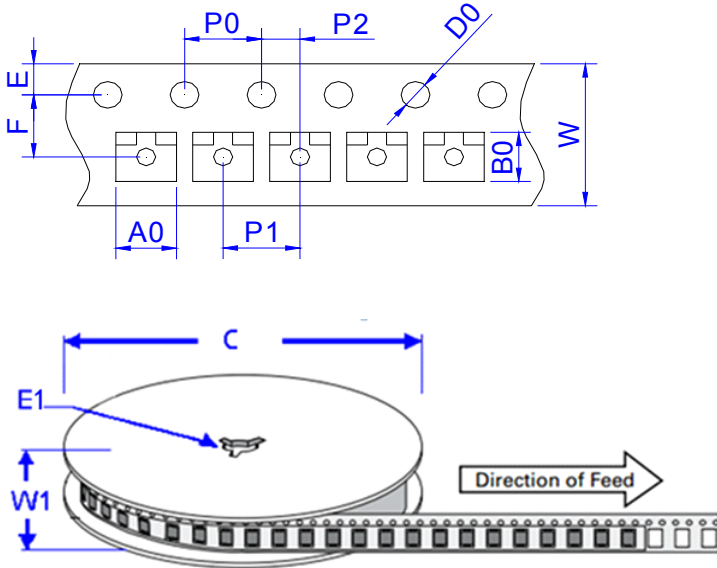
Marking



2301A: Device Code



Package Information-SOT-23



Ref.	Dimensions	
	Millimeters	Inches
A0	3.15 ± 0.3	0.124 ± 0.012
B0	2.77 ± 0.3	0.109 ± 0.012
C	178	7.0
D0	1.50±0.1	0.059 ± 0.004
E	1.75 ± 0.2	0.069 ± 0.008
E1	13.3±0.3	0.524± 0.012
F	3.5 ± 0.2	0.138 ± 0.008
P0	4.00 ± 0.2	0.157 ± 0.008
P1	4.00 ± 0.2	0.157 ± 0.008
P2	2.00 ± 0.2	0.079 ± 0.008
W	8.00 ± 0.2	0.315 ± 0.008
W1	11.5±1.0	0.453 ± 0.039

Ordering Information-SOT-23

OUTLINE	PACKAGE TYPE	QUANTITY REEL	DESCRIPTION
TAPING	SOT-23	3,000pcs	7 inch reel pack