

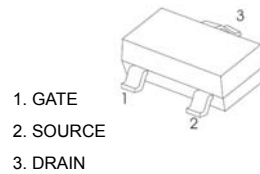
**FEATURES**

- \* High density cell design for low  $R_{DS(ON)}$
- \* Voltage controlled small signal switch
- \* Rugged and reliable
- \* High saturation current capability

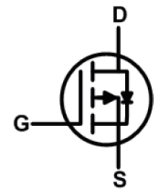
$V_{DSS}$  -20 V  
 $I_D$  -2.3 A  
 $R_{DS(ON)}$  90 m  $\Omega$

A1SHB.

**SOT-23**



**Equivalent Circuit**



**MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS**

**Maximum ratings ( $T_a=25^\circ\text{C}$  unless otherwise noted)**

Parameter	Symbol	Value	Unit
Drain-Source Voltage	$V_{DS}$	-20	V
Gate-Source Voltage	$V_{GS}$	$\pm 8$	
Continuous Drain Current	$I_D$	-2.3	A
Pulsed Drain Current	$I_{DM}$	-10	
Continuous Source-Drain Diode Current	$I_S$	-0.72	
Maximum Power Dissipation	$P_D$	1.0	W
Thermal Resistance from Junction to Ambient( $t \leq 5s$ )	$R_{\theta JA}$	357	$^\circ\text{C}/\text{W}$
Junction Temperature	$T_J$	150	$^\circ\text{C}$
Storage Temperature	$T_{stg}$	-55 ~ +150	

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

Parameter	Symbol	Test Condition	Min	Typ	Max	Units
<b>Static</b>						
Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = -250\mu A$	-20			V
Gate-source threshold voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\mu A$	-0.4		-1	
Gate-source leakage	$I_{GSS}$	$V_{DS} = 0V, V_{GS} = \pm 8V$			$\pm 100$	nA
Zero gate voltage drain current	$I_{DSS}$	$V_{DS} = -20V, V_{GS} = 0V$			-1	$\mu A$
Drain-source on-state resistance <sup>a</sup>	$R_{DS(on)}$	$V_{GS} = -4.5V, I_D = -2.8A$		0.090	0.112	$\Omega$
		$V_{GS} = -2.5V, I_D = -2.0A$		0.110	0.142	
Forward transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = -5V, I_D = -2.8A$		6.5		S
<b>Dynamic<sup>b</sup></b>						
Input capacitance	$C_{iss}$	$V_{DS} = -10V, V_{GS} = 0V, f = 1MHz$		405		pF
Output capacitance	$C_{oss}$			75		
Reverse transfer capacitance	$C_{rss}$			55		
Total gate charge	$Q_g$	$V_{DS} = -10V, V_{GS} = -4.5V, I_D = -3A$		5.5	10	nC
		$V_{DS} = -10V, V_{GS} = -2.5V, I_D = -3A$		3.3	6	
Gate-source charge	$Q_{gs}$	$V_{DS} = -10V, V_{GS} = -2.5V, I_D = -3A$		0.7		
Gate-drain charge	$Q_{gd}$			1.3		
Gate resistance	$R_g$	$f = 1MHz$		6.0		$\Omega$
Turn-on delay time	$t_{d(on)}$	$V_{DD} = -10V,$ $R_L = 10\Omega, I_D = -1A,$ $V_{GEN} = -4.5V, R_g = 1\Omega$		11	20	ns
Rise time	$t_r$			35	60	
Turn-off delay time	$t_{d(off)}$			30	50	
Fall time	$t_f$			10	20	
<b>Drain-source body diode characteristics</b>						
Continuous source-drain diode current	$I_S$	$T_C = 25^\circ\text{C}$			-1.3	A
Pulse diode forward current <sup>a</sup>	$I_{SM}$				-10	
Body diode voltage	$V_{SD}$	$I_S = -0.7A$		-0.8	-1.2	V

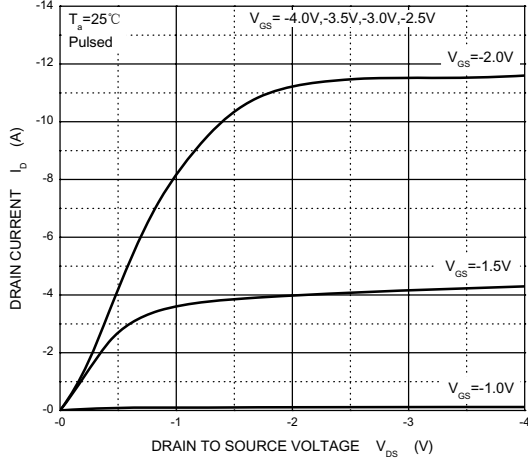
**Notes :**

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

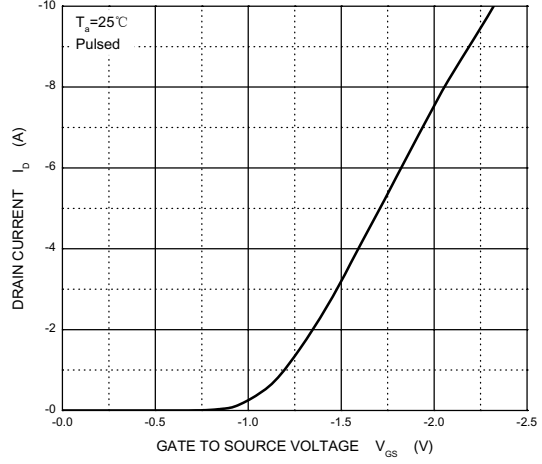
b. Guaranteed by design, not subject to production testing.

RATING AND CHARACTERISTIC CURVES

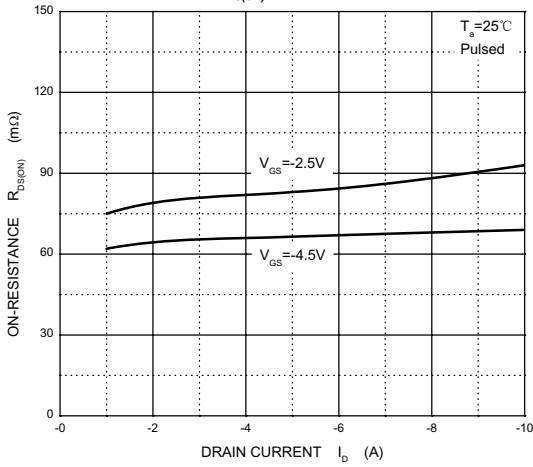
Output Characteristics



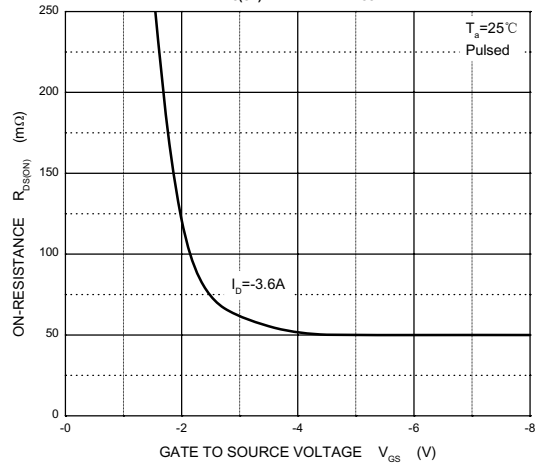
Transfer Characteristics



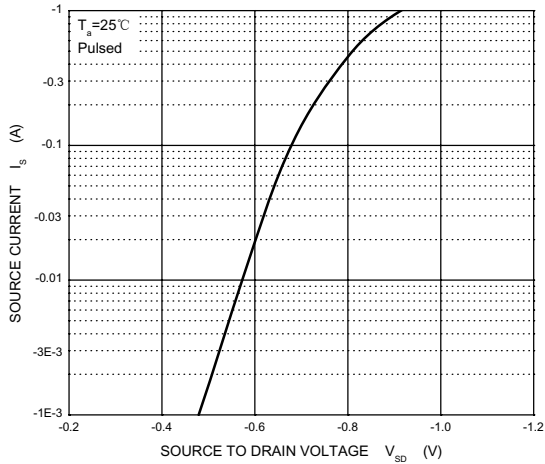
$R_{DS(ON)}$  —  $I_D$



$R_{DS(ON)}$  —  $V_{GS}$

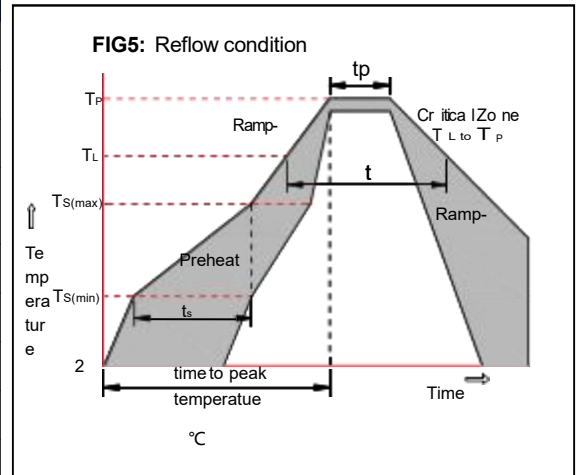


$I_S$  —  $V_{SD}$



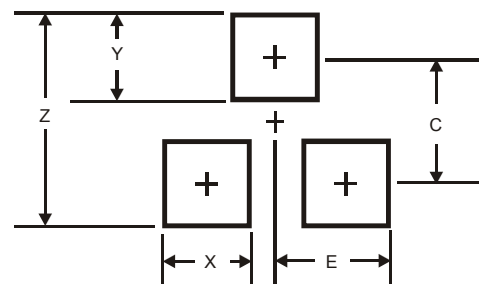
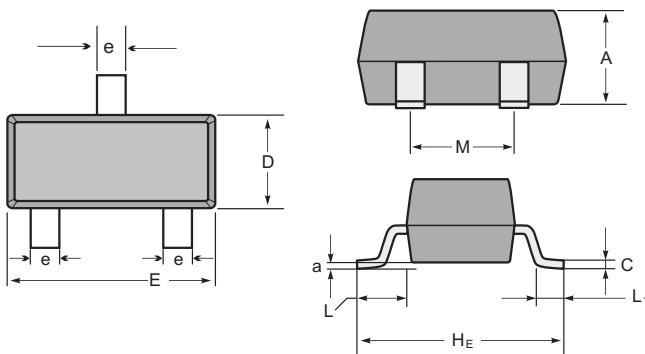
Soldering parameters

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

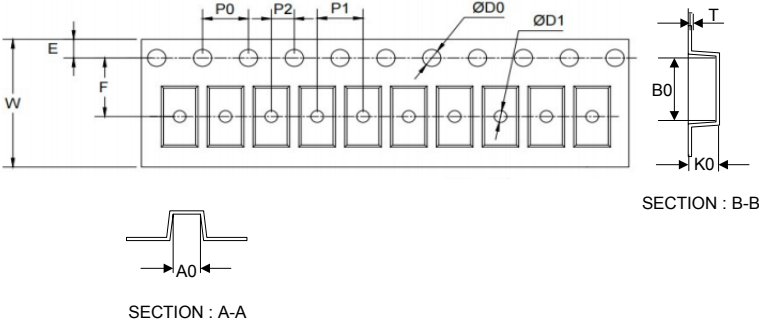


SOT-23 mechanical data

UNIT	A	C	D	E	HE	e	M	L	L1	a
mm	max	1.1	0.15	1.4	3.0	0.5	1.95	0.55 (ref)	0.36 (ref)	0.0
	min	0.9	0.08	1.2	2.8	0.3	1.7			0.15
mil	max	43	6	55	118	20	77	22 (ref)	14 (ref)	0.0
	min	35	3	47	110	12	67			6

Dimensions	SOT23
Z	2.9
X	0.8
Y	0.9
C	2.0
E	1.35

Tape & reel specification

Tape	Symbol	Dimension (mm)	
	P0	4.00±0.10	
	P1	4.00±0.10	
	P2	2.00±0.10	
	D0	1.55±0.10	
	D1	1.05±0.10	
	E	1.55±0.10	
	F	3.60±0.10	
	W	8.00±0.10	
	A0	3.80±0.20	
	B0	3.25±0.20	
7" Reel	K0	1.45±0.10	
	T	0.25±0.05	
	D2	178.0±3.0	
	D3	55Min.	
	D4	R24.0±3.0	
	G	R82.0±3.0	
	I	13.0±2.0	
	W1	11.0±3.0	
	Quantity: 3000PCS		