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

Features

Low Gate Charge
High Power and current handing capability
Lead free product is acquired

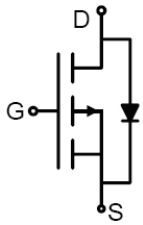
A1SHB

Applications

DC/DC Converter
Ideal for high-frequency switching and synchronous rectification

SOT-523 top view

Equivalent Circuit



MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings (T_A=25℃ unless otherwise noted)

Symbol	Parameter	Limit	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(T_A=25℃)	-2.3	A
	Drain Current-Continuous(T_A=100℃)	-1.3	A
$I_{DM\ (pluse)}$	Drain Current-Continuous@ Current-Pulsed (Note 1)	-8	A
P_D	Maximum Power Dissipation(T_A=25℃)	0.78	W
	Maximum Power Dissipation(T_A=100℃)	0.3	W
E_{AS}	Avalanche energy (Note 2)	5	mJ
T_J, T_{STG}	Operating Junction and Storage Temperature Range	-55 To 150	℃

Thermal Characteristic

Symbol	Parameter	Typ	Max	Unit
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient		160	℃/W

Electrical Characteristics (T_J=25℃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			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=-20V, V_{GS}=0V T_J=25℃			-1	μA
		V_{DS}=-20V, V_{GS}=0V T_J=125℃			-100	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		-1	V
g_{FS}	Forward Transconductance	V_{DS}=-5V, I_D=-1.5A		4.4		S
$R_{DS(ON)}$	Drain-Source On-State Resistance	V_{GS}=-4.5V, I_D=-1.5A T_J=25℃		90	115	mΩ
$R_{DS(ON)}$	Drain-Source On-State Resistance	V_{GS}=-2.5V, I_D=-1A T_J=25℃		110	140	mΩ
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS}=-10V,V_{GS}=0V, f=1.0MHz		225		pF
C_{oss}	Output Capacitance			34		pF
C_{rss}	Reverse Transfer Capacitance			27		pF
R_g	Gate resistance	V_{GS}=0V, V_{DS}=0V, f=1.0MHz		47		Ω
Switching Parameters						
$t_{d(on)}$	Turn-on Delay Time	V_{GS}=-4.5V, V_{DS}=-10V, R_L=3.3Ω, R_{GEN}=3Ω		11		nS
t_r	Turn-on Rise Time			34		nS
$t_{d(off)}$	Turn-Off Delay Time			55		nS
t_f	Turn-Off Fall Time			51		nS
Q_g	Total Gate Charge	V_{GS}=-4.5V, V_{DS}=-10V, I_D=-3A		9.1		nC
Q_{gs}	Gate-Source Charge			1.6		nC
Q_{gd}	Gate-Drain Charge			2		nC
Source-Drain Diode Characteristics						
I_{SD}	Source-Drain Current (Body Diode)				-2.3	A
V_{SD}	Forward on Voltage (Note 3)	V_{GS}=0V, I_S=-3A			-1.2	V

Notes 1.Repetitive Rating: Pulse width limited by maximum junction temperature.
Notes 2.E_{AS} condition: T_J=25℃,V_{DD}=-20V,V_G=-10V, Rg=25Ω, L=0.5mH.
Notes 3.Repetitive Rating: Pulse width limited by maximum junction temperature.

RATING AND CHARACTERISTIC CURVES

Figure 1. Output Characteristics

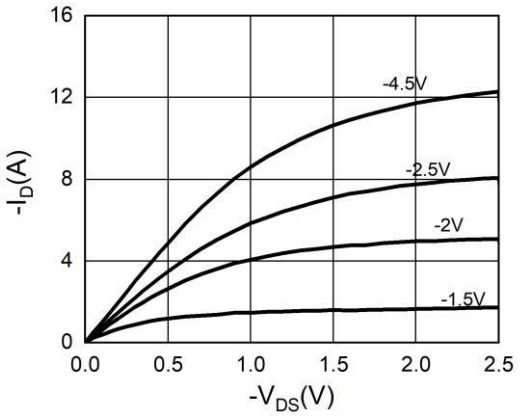


Figure 2. Transfer Characteristics

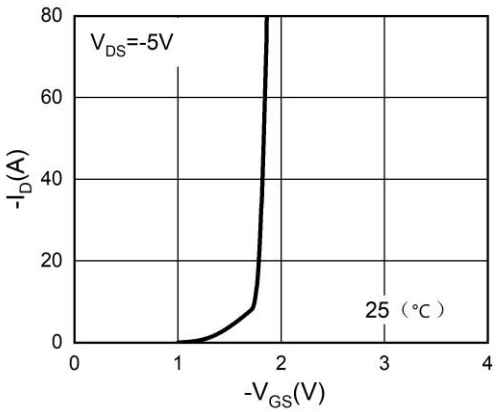


Figure 3. Power Dissipation

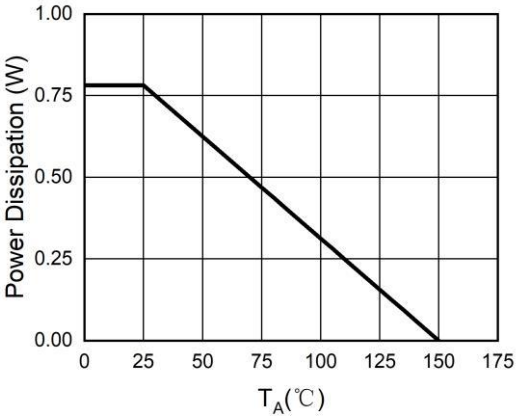


Figure 4. Drain Current

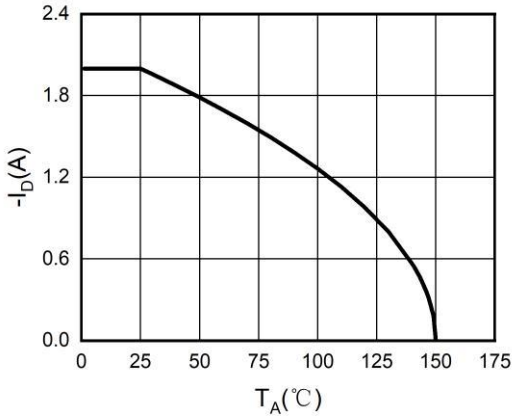


Figure 5. BV_{DSS} vs Junction Temperature

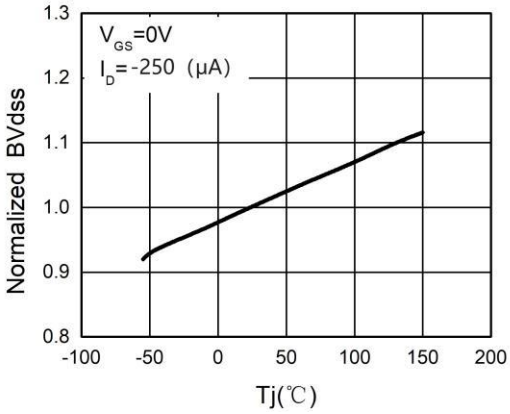
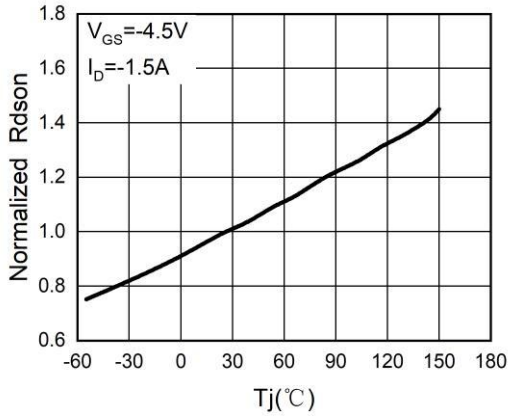


Figure 6. $R_{DS(ON)}$ vs Junction Temperature



RATING AND CHARACTERISTIC CURVES

Figure 7. Gate Charge Waveforms

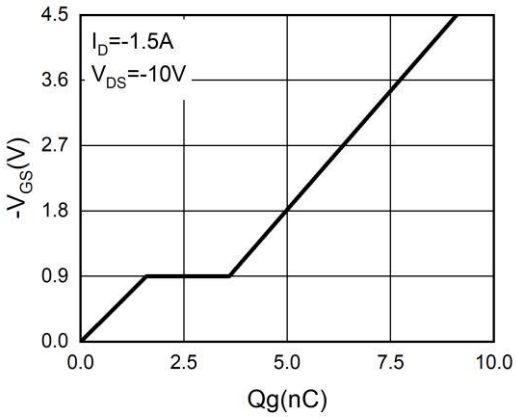


Figure 8. Capacitance

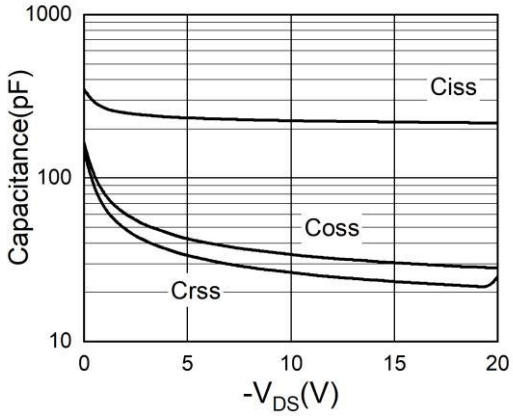


Figure 9. Body-Diode Characteristics

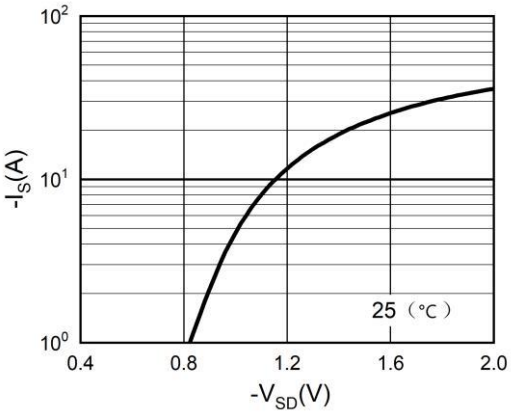
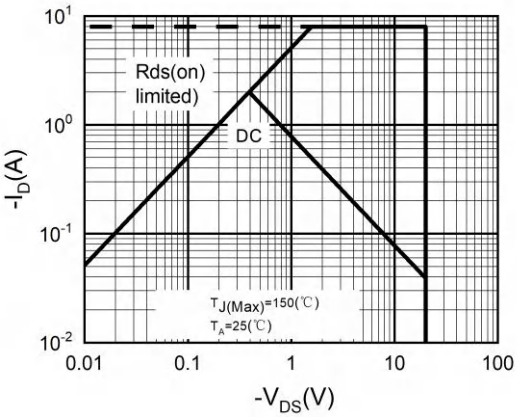


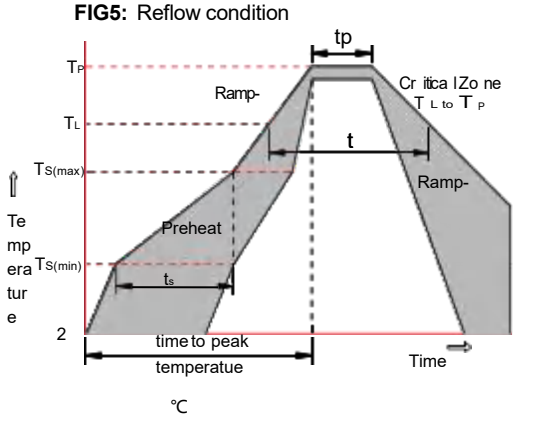
Figure 10. Maximum Safe Operating Area



Soldering parameters

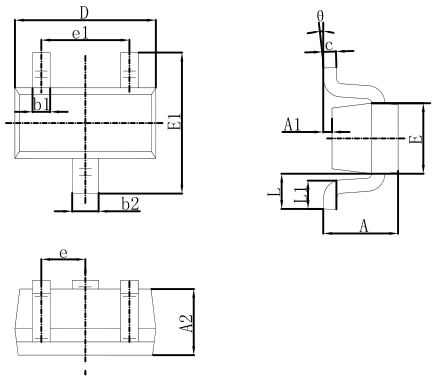
Reflow Condition		Pb-Free assembly (see as bellow)
Pre Heat	-Temperature Min ($T_{s(min)}$)	+150℃
	-Temperature Max($T_{s(max)}$)	+200℃
	-Time (Min to Max) (ts)	60-180 secs.
Average ramp up rate (Liquid us Temp (T_L) to peak)		3℃/sec. Max
$T_{s(max)}$ to T_L - Ramp-up Rate		3℃/sec. Max
Reflow	-Temperature(T_L)(Liquid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

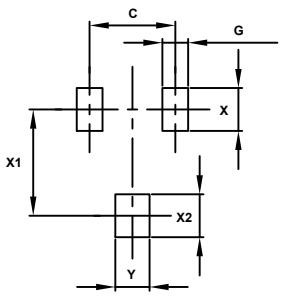
FIG5: Reflow condition



Package Dimensions & Suggested Pad Layout

SOT-523





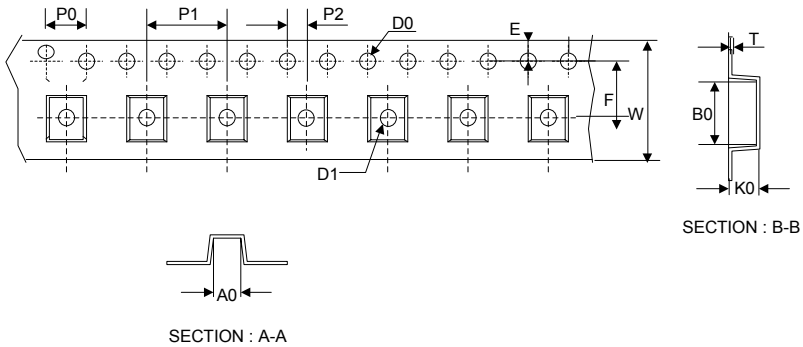
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.700	0.900	0.028	0.035
A1	0.000	0.100	0.000	0.004
A2	0.700	0.800	0.028	0.031
b1	0.150	0.250	0.006	0.010
b2	0.250	0.350	0.010	0.014
c	0.100	0.200	0.004	0.008
D	1.500	1.700	0.059	0.067
E	0.700	0.900	0.028	0.035
E1	1.450	1.750	0.057	0.069
e	0.500 TYP.		0.020 TYP.	
e1	0.900	1.100	0.035	0.043
L	0.400 REF.		0.016 REF.	
L1	0.260	0.460	0.010	0.018
θ	0°	8°	0°	8°

Dimensions in inches and (millimeters)

Dimensions	Value (in mm)
C	1.00
G	0.45
X	0.70
X1	1.40
X2	0.70
Y	0.60

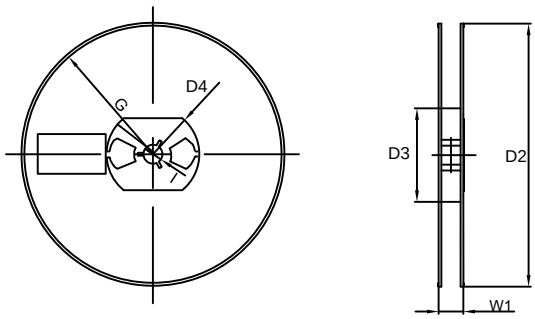
Tape & rell specification

Tape



Symbol	Dimension (mm)
P0	4.00±0.20
P1	4.00±0.20
P2	2.00±0.20
D0	1.55±0.20
D1	0.65±0.20
E	1.55±0.25
F	3.60±0.20
W	8.00±0.20
A0	2.10±0.20
B0	2.20±0.20
K0	1.10±0.20
T	0.20±0.20

7” Reel



D2	177.0±5.0
D3	55Min.
D4	R24.6±2.0
G	R82.0±2.0
I	13.0±2.0
W1	10.20±3.0
Quantity: 3000PCS	