6.8A, 20V N-CHANNEL MOSFET

DESCRIPTION:

The ALPMN2312A is a 6.8A, 20V N-Channel MOSFET and it has Excellent $R_{DS(ON)}$ and low gate charge, making these devices ideal for applications like dc−dc converters and power management in portable and battery−powered products.

FEATURES:

- $V_{(BR)DSS}$ = 20V, I_D = 6.8A
- $R_{DS\ (ON)\ TYP}$ = 17mΩ @V_{GS} = 4.5V, I_D = 6.8A
- $R_{DS\ (ON)\ TYP}$ = 20mΩ @V_{GS} = 2.5V, I_D = 6.8A
- $R_{DS\ (ON)\ TYP}$ = 30mΩ @V_{GS} = 1.8V, I_D = 6.8A
- Low gate charge
- TrenchFET Power MOSFET
- Lead-free parts meet RoHS requirements

APPLICATIONS:

- DC/DC Converter
- Load switch
- Portable Devices
- Battery Switch

MECHANICAL CHARACTERISTICS

- Epoxy: UL94-V0 rated flame retardant.
- Case: Molded plastic, SOT-23
- Terminals: Solder plated, solderable per MIL-STD-750, Method 2026
- Mounting Position: Any.

MAXIMUM RATINGS

MAXIMUM RATINGS @ T_A = 25 °C unless otherwise specified			
PARAMETER	**SYMBOL**	**VALUE**	**UNIT**
Drain-Source Voltage	V_{DS}	20	V
Gate-Source Voltage	V_{GS}	±12	V
Continuous Drain Current [1,4] @T_A =25°C	I_D	6.8	A
Pulsed Drain Current [2]	I_{DM}	20	A
Power Dissipation [3,4] @T_A =25°C	P_D	1.5	W
Thermal Resistance from Junction to Ambient [4]	$R_{\theta JA}$	83.3	°C/W
Junction Temperature Range	T_J	-55 to +150	°C
Storage Temperature Range	T_{STG}	-55 to +150	°C

Note:
1.The maximum current rating is limited by package.
2.Pulse Test: Pulse Width ≤ 10μs, duty cycle ≤ 1%.
3.The power dissipation P_D is limited by $T_{J(MAX)}$ = 150°C.
4.Device mounted on 1in2 FR-4 board with 2oz. Copper, in a still air environment with T_A =25°C.

ELECTRICAL CHARACTERISTICS @ TA = 25 °C unless otherwise specified

PARAMETER	CONDITIONS	SYMBOL	MIN	TYP.	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	V_{GS} = 0V, I_D = 250 µA	$V_{(BR)DSS}$	20			V
Zero gate voltage drain current	V_{DS} = 20V, V_{GS} = 0V	I_{DSS}			1	µA
Gate-body leakage current	V_{GS} = ±8V, V_{DS} = 0V	I_{GSS}			±0.1	µA
ON CHARACTERISTICS						
Gate-Threshold Voltage	V_{DS} = V_{GS}, I_D = 250µA	$V_{GS(th)}$	0.45	0.7	1.0	V
Drain-Source On-Resistance (5)	V_{GS} = 4.5V, I_D = 5.0A	$R_{DS(ON)}$		17	24	mΩ
	V_{GS} = 2.5V, I_D = 4.7A			20	32	
	V_{GS} = 1.8V, I_D = 4.3A			30	42	
Forward transconductance (5)	V_{DS} = 10V, I_D = 5.0A	g_{FS}	6			S

DYNAMIC CHARACTERISTICS						
PARAMETER	**CONDITIONS**	**SYMBOL**	**MIN**	**TYP.**	**MAX**	**UNIT**
Input Capacitance	V_{DS} = 10V, V_{GS} = 0V, f = 1.0 MHz	C_{iss}		865		pF
Output Capacitance	V_{DS} = 10V, V_{GS} = 0V, f = 1.0 MHz	C_{oss}		105		pF
Reserve Transfer Capacitance	V_{DS} = 10V, V_{GS} = 0V, f = 1.0 MHz	C_{rss}		55		pF
Gate Resistance	f = 1.0 MHz	R_g	0.5		4.8	Ω

SWITCHING CHARACTERISTICS						
PARAMETER	**CONDITIONS**	**SYMBOL**	**MIN**	**TYP.**	**MAX**	**UNIT**
Turn-On Delay Time	V_{GEN} = 5V, V_{DD} = 10V, I_D = 4A, R_G = 1Ω, R_L = 2.2Ω	$t_{d(on)}$			10	ns
Turn-On Rise time	V_{GEN} = 5V, V_{DD} = 10V, I_D = 4A, R_G = 1Ω, R_L = 2.2Ω	t_r			20	ns
Turn-Off Delay Time	V_{GEN} = 5V, V_{DD} = 10V, I_D = 4A, R_G = 1Ω, R_L = 2.2Ω	$t_{d(off)}$			32	ns
Turn-Off Fall time	V_{GEN} = 5V, V_{DD} = 10V, I_D = 4A, R_G = 1Ω, R_L = 2.2Ω	t_f			12	ns

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS						
PARAMETER	**CONDITIONS**	**SYMBOL**	**MIN**	**TYP.**	**MAX**	**UNIT**
Drain Forward Voltage (5)	I_S = 4A, V_{GS} = 0V	V_{DS}		0.75	1.2	V

Note:

5. Pulse Test: Pulse Width ≤ 300µs, duty cycle ≤ 2%.

TYPICAL DEVICE RATING AND CHARACTERISTICS CURVES (T_A = 25 °C unless otherwise noted)

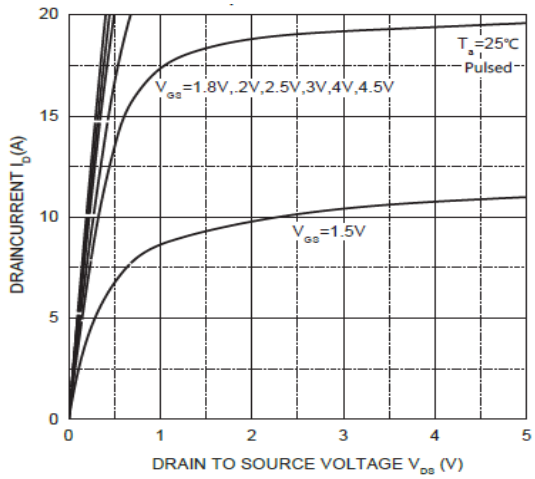


Fig.1 OUTPUT CHARACTERISTICS

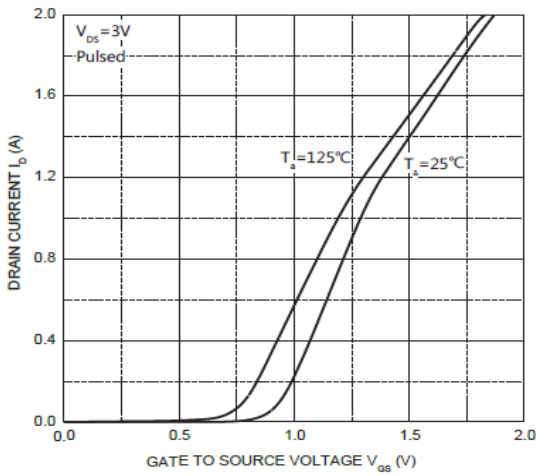


Fig.2 TRANSFER CHARACTERISTICS

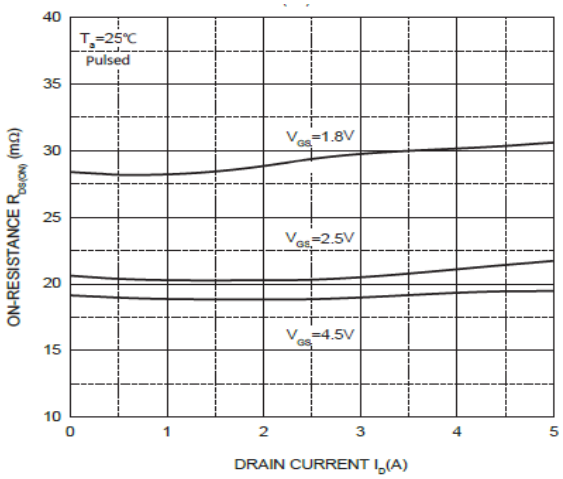


Fig.3 $R_{DS(ON)}$ Vs. I_D

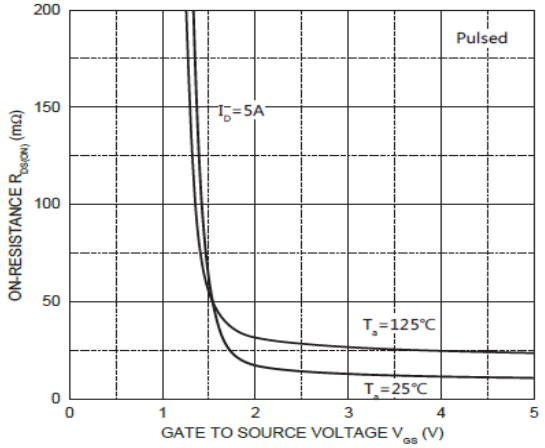


Fig.4 $R_{DS(ON)}$ Vs. V_{GS}

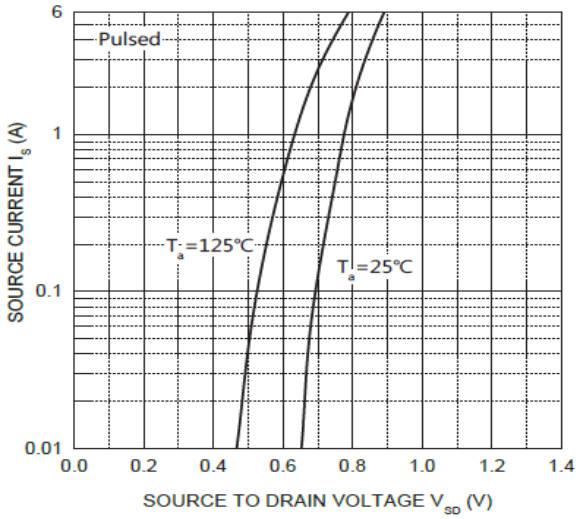


Fig.5 I_S Vs. V_{SD}

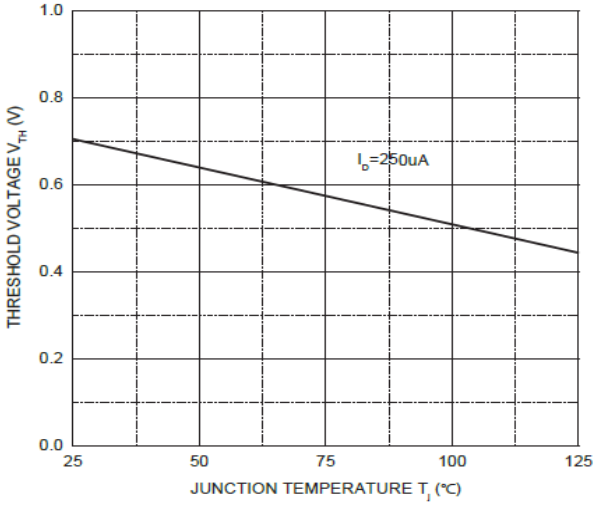
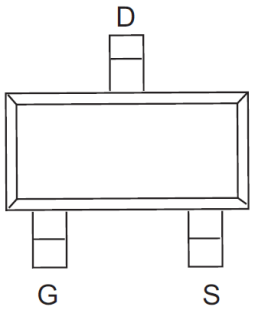
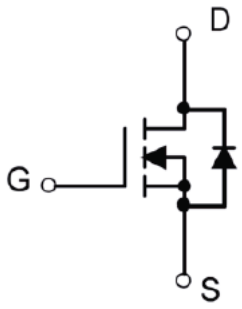


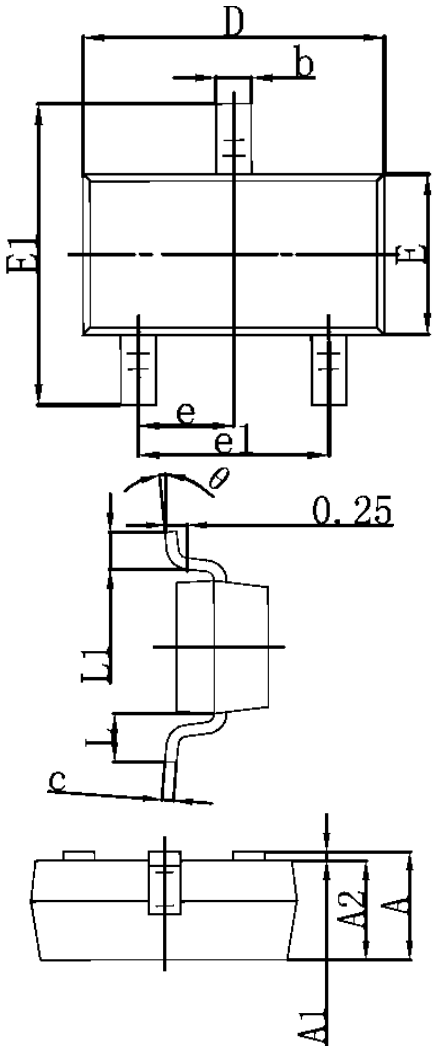
Fig.6 THRESHOLD VOLTAGE

PINNING INFORMATION

PIN	SIMPLIFIED OUTLINE	SCHEMATIC DIAGRAM
Pin D Drain Pin G Gate Pin S Source		

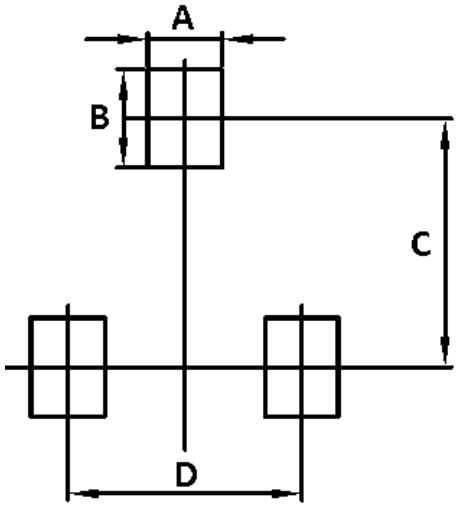
PACKAGE INFORMATION

SOT-23



OUTLINE DIMENSIONS				
	MILLIMETERS		INCHES	
SYMBOL	MIN	MAX	MIN	MAX
A	0.90	1.15	0.035	0.045
A1	0.00	0.10	0.000	0.004
A2	0.90	1.05	0.035	0.041
b	0.30	0.50	0.012	0.020
c	0.08	0.15	0.003	0.006
D	2.80	3.00	0.110	0.118
E	1.20	1.40	0.047	0.055
E1	2.25	2.55	0.089	0.100
e	0.95 TYP.		0.037 TYP.	
e1	1.80	2.00	0.071	0.079
L	0.55 REF.		0.022 REF.	
L1	0.30	0.50	0.012	0.020
θ	0°	8°	0°	8°

SUGGESTED SOLDER PAD LAYOUT



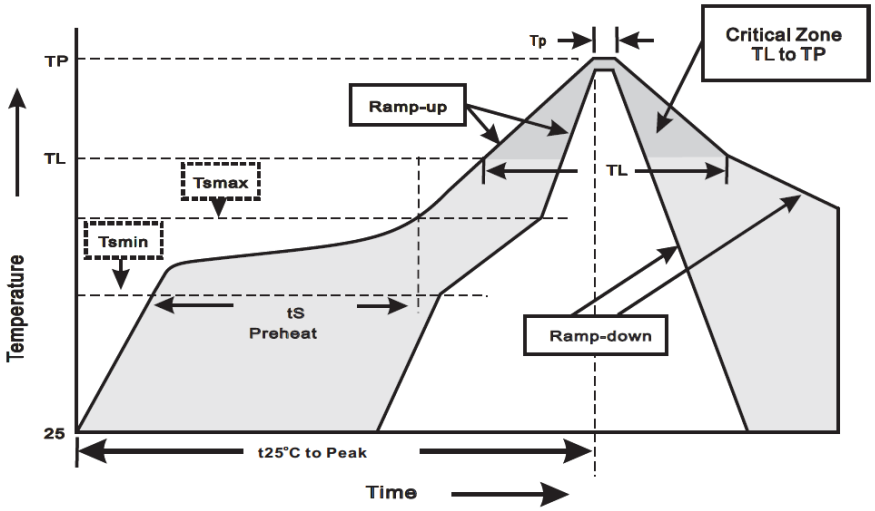
OUTLINE DIMENSIONS		
SYMBOL	MILLIMETERS	INCHES
A	0.60	0.024
B	0.80	0.031
C	2.02	0.080
D	1.90	0.075

Note:
1. Controlling dimension: in millimeters.
2. General tolerance: ±0.05mm
3. The pad layout is for reference purposes only.

SOLDERING PARAMETERS

SUGGESTED THERMAL PROFILES FOR SOLDERING PROCESSES

1. Storage environment: Temperature=5 °C~40 °C Humidity=55% ±25%
2. Reflow soldering of surface-mount devices



3. Reflow soldering

PROFILE FEATURE	SOLDERING CONDITION
Average ramp-up rate (T_L to T_P)	<3 °C/sec
Preheat - Temperature Min (T_{smin}) - Temperature Max (T_{smax}) - Time (min to max) (t_s)	 150 °C 200 °C 60 ~ 120 sec
T_{smax} to T_L - Ramp-upRate	 <3 °C/sec
Time maintained above: - Temperature (T_L) - Time(tL)	 217 °C 60 ~ 260 sec
Peak Temperature (T_P)	255 °C-0/+5 °C
Time within 5 °C of actual Peak Temperature(tP)	10 ~ 30 sec
Ramp-down Rate	<6 °C/sec
Time 25 °C to Peak Temperature	<6 minutes

CUSTOMER NOTE:

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2. In Europe, please dispose as per EU Directive 2002/96/EC on Waste Electrical and Electronic Equipment (WEEE).

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