A1EDB1V Data Sheet

Abstract

The A1EDB1V is a high-performance, dual-channel SiC gate driver adaptor board based on intelligent chip technology by Firstack. It supports SiC modules up to 1700V. The A1EDB1V need to be used with 2FHD0620, which can flexibly match 1~3 SiC modules. The A1EDB1V integrates driver protection, intelligent fault management, distributed NTC sampling and other functions, and is suitable for EconoDual. The A1EDB1V is mainly used in ESS, motor drives, rail and other high reliability fields.

Highlights:

● Support max. 4 in parallel

● Support up to 1700V SiC module

● Distributed NTC sampling

● Short-circuit protection(soft shut down)

● Miller clamping

● Configurable drive voltage

● Intelligent fault feedback
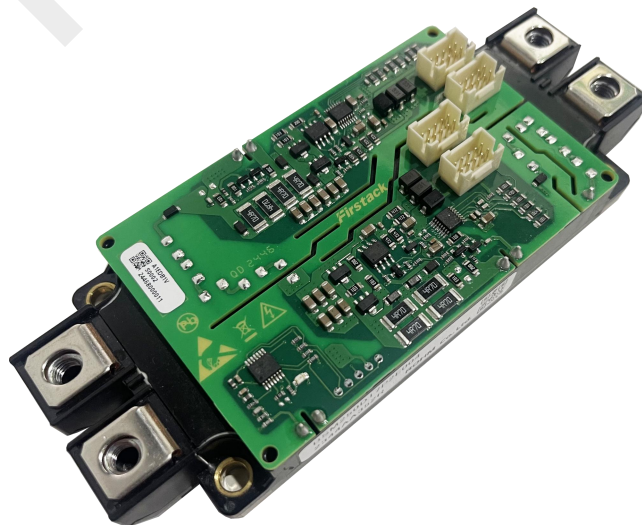
● UVLO

Applications:

● ESS

● Motor drives

● Rail

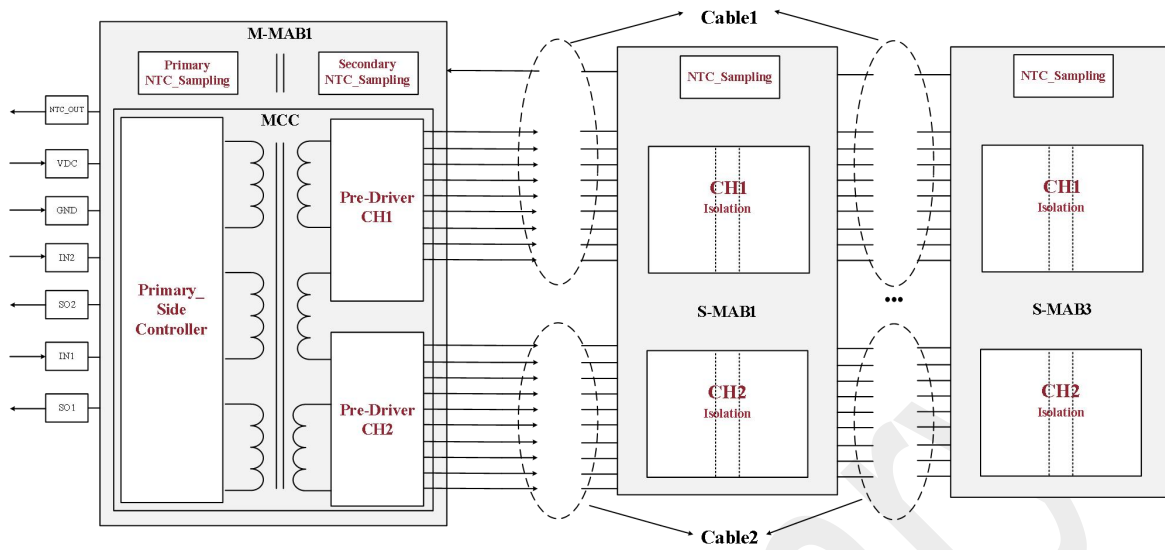**FIg.1**　A1EDB1V-S0002

Functional Block Diagram

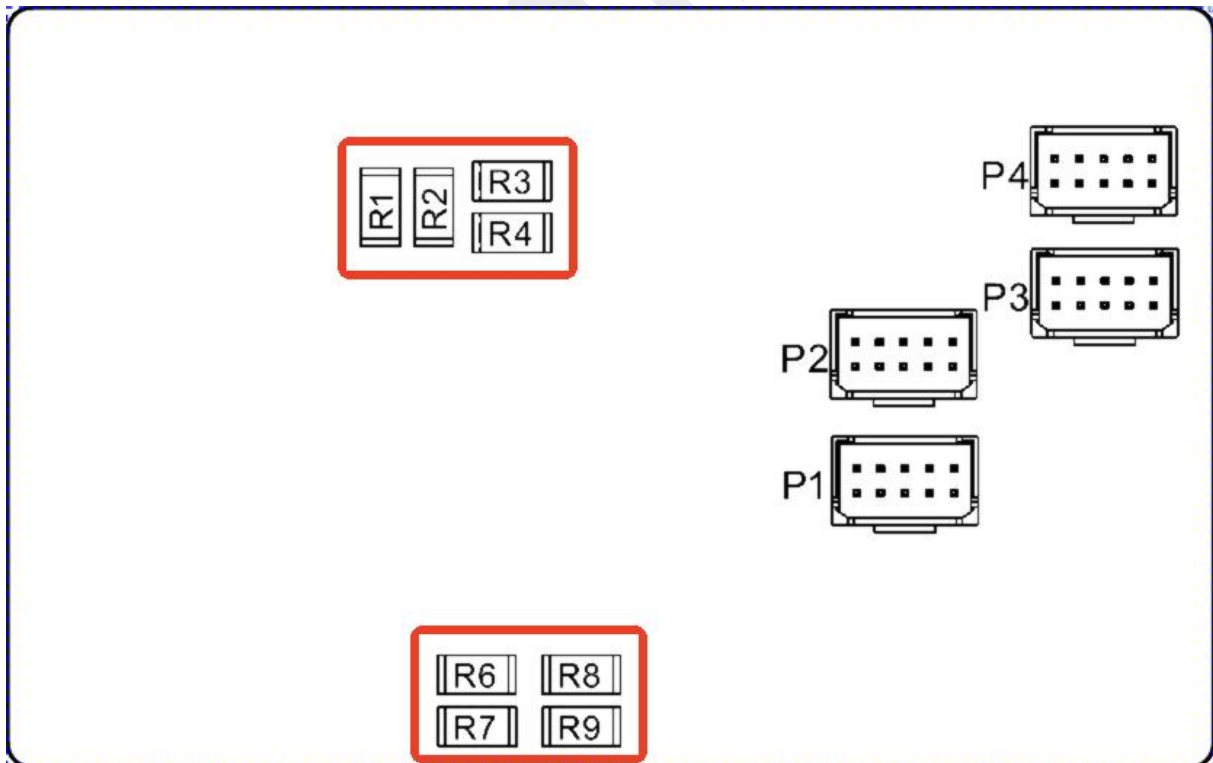**Fig.2**　Functional block diagram
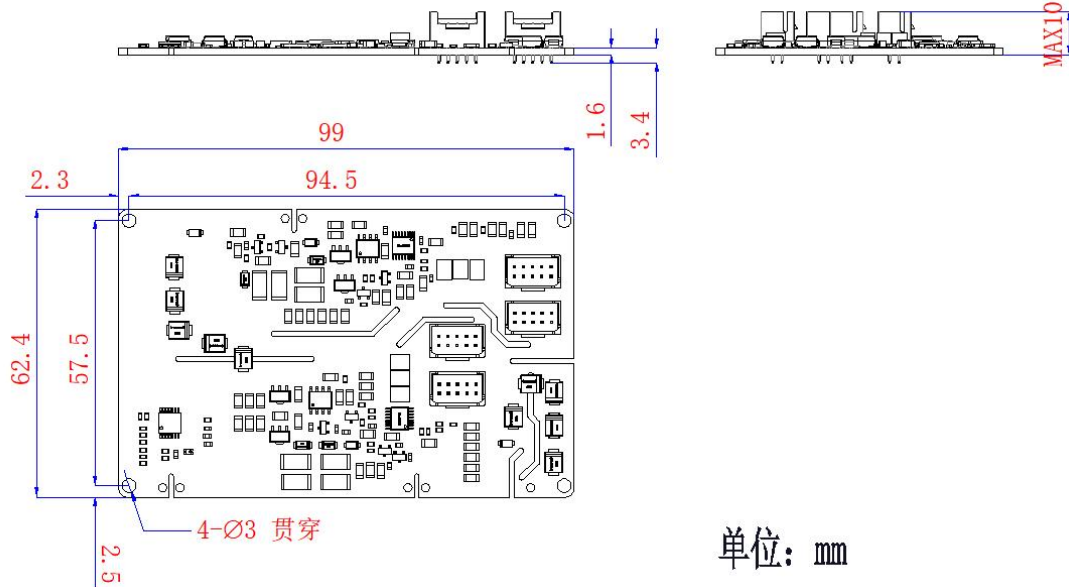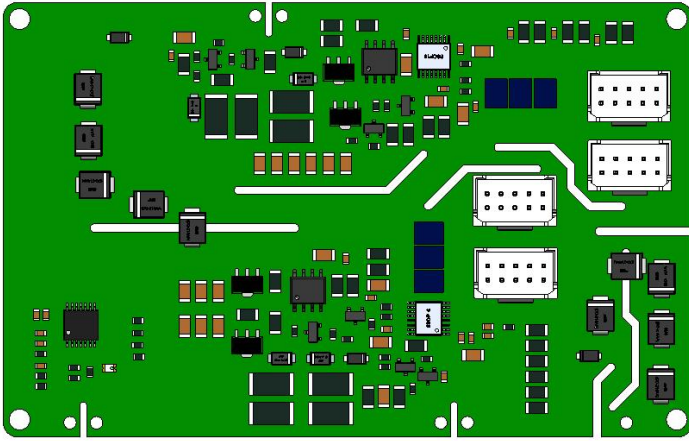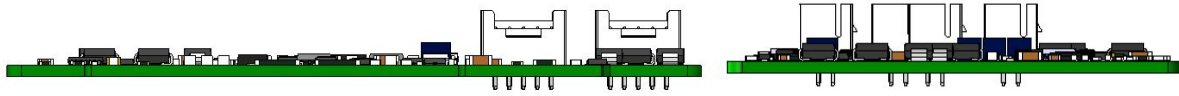
Connector Interface Designation

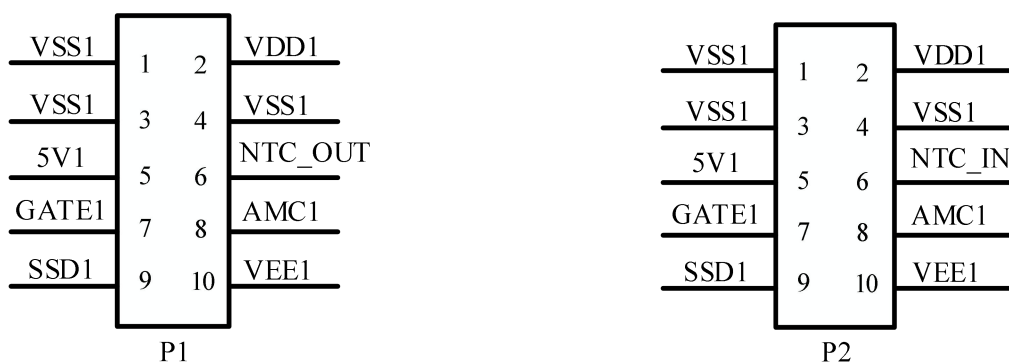**Fig.3**　Connector interface location

3D and Mechanical Dimensions

单位：mm

Note: 1. The thickness tolerance of the board is ±10%;

2. Other dimensional tolerances refer to GB/T1804-m;

Gate Resistor Change Instructions

Resistor	Definition
R1,R2 & R8,R9	Turn-on resistor
R3,R4 & R6,R7	Turn-off resistor

P1,P2 terminals pin designation(2FHD0620 channel 1)

P1 diagram	P2 diagram
VSS1 — 1 / 2 — VDD1 VSS1 — 3 / 4 — VSS1 5V1 — 5 / 6 — NTC_OUT GATE1 — 7 / 8 — AMC1 SSD1 — 9 / 10 — VEE1 **P1**	VSS1 — 1 / 2 — VDD1 VSS1 — 3 / 4 — VSS1 5V1 — 5 / 6 — NTC_IN GATE1 — 7 / 8 — AMC1 SSD1 — 9 / 10 — VEE1 **P2**

P1	Definition	Function	P2	Definition	Function
1	VSS1	Secondary side negative supply channel 1	1	VSS1	Secondary side negative supply channel 1
2	VDD1	Secondary side positive supply channel 1	2	VDD1	Secondary side positive supply channel 1
3	VSS1	Secondary side negative supply channel 1	3	VSS1	Secondary side negative supply channel 1
4	VSS1	Secondary side negative supply channel 1	4	VSS1	Secondary side negative supply channel 1
5	5V1	Secondary side 5V supply channel 1	5	5V1	Secondary side 5V supply channel 1
6	NTC_OUT	NTC sampling output signal channel 1	6	NTC_IN	NTC sampling input signal channel 1
7	GATE1	Gate drive signal channel 1	7	GATE1	Gate drive signal channel 1
8	AMC1	Miller clamping signal channel 1	8	AMC1	Miller clamping signal channel 1
9	SSD1	Soft shut down signal channel 1	9	SSD1	Soft shut down signal channel 1
10	VEE1	Secondary side ground channel 1	10	VEE1	Secondary side ground channel 1

P3,P4 terminals pin designation(2FHD0620 channel 2)

P3

P4
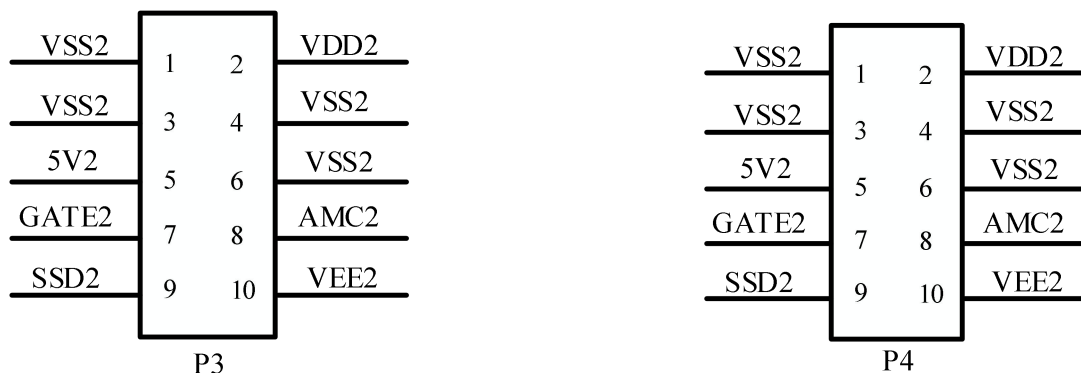
P3	Definition	Function	P4	Definition	Function
1	VSS2	Secondary side negative supply channel 2	1	VSS2	Secondary side negative supply channel 2
2	VDD2	Secondary side positive supply channel 2	2	VDD2	Secondary side positive supply channel 2
3	VSS2	Secondary side negative supply channel 2	3	VSS2	Secondary side negative supply channel 2
4	VSS2	Secondary side negative supply channel 2	4	VSS2	Secondary side negative supply channel 2
5	5V2	Secondary side 5V supply channel 2	5	5V2	Secondary side 5V supply channel 2
6	VSS2	Secondary side negative supply channel 2	6	VSS2	Secondary side negative supply channel 2
7	GATE2	Gate drive signal channel 2	7	GATE2	Gate drive signal channel 2
8	AMC2	Miller clamping signal channel 2	8	AMC2	Miller clamping signal channel 2
9	SSD2	Soft shut down signal channel 2	9	SSD2	Soft shut down signal channel 2
10	VEE2	Secondary side ground channel 2	10	VEE2	Secondary side ground channel 2

Technical Parameters

Recommended Operating Conditions

Parameter	Remarks	Min	Typ	Max	Unit
Static loss per channel	Without load		0.5		W
Output power per channel	Full load		1		W
Peak current per channel		-15		20	A
Operating temperature		-40		85	℃
Storage temperature		-40		85	℃

Gate Parameters

Output voltage	Remarks	Min	Typ	Max	Unit
Total gate voltage	V_{GSon}-V_{GSoff}	19.5	22	24.5	V
Gate positive voltage V_{GSon}	Turn on (ON)	14.5	18	19.5	V
Gate negative voltage V_{GSoff}	Turn off (OFF)	-9.5	-4	-0.5	V

Short-Circuit Protection

Parameter	Remarks	Min	Typ	Max	Unit
V_{DS} monitoring threshold	Short-circuit protection threshold	Configurable	11	Configurable	V
Response time	Note 1	Configurable	1.2	Configurable	μs
Soft shut down time		Configurable	6.24	Configurable	μs

Miller Clamping

Parameter	Remarks	Min	Typ	Max	Unit
Time from drive signal turn-off to clamp turn-on		Configurable	1.04	Configurable	ns
Time from clamp turn-off to drive signal turn-on			500		ns
Clamp voltage			VSS (negative voltage)		

Timing Characteristics

Parameter	Remarks	Min	Typ	Max	Unit
Turn-on delay	Note 2		1.2		μs
Turn-off delay	Note 3		1.3		μs
Rise time	Note 4		12		ns
Fall time	Note 5		12		ns

Electrical Isolation

Parameter	Remarks	Min	Typ	Max	Unit
Creepage distance	Secondary to secondary side, Note 6		25		mm
Clearance distance	Secondary to secondary side		6		mm

NTC Sampling

Parameter	Remarks	Duty cycle for temperature output			Unit
Temperature output	Fixed frequency 4K, variable duty cycle, output the highest temperature	Note 7			μs

Note:

1. Response time: the time from the occurrence of the fault to the start of soft shut down;

2. Turn-on delay: the time required to transmit from the rising edge of the PWM signal from the primary input to the rising edge of the secondary of the gate driver;

3. Turn-off delay: the time required to transmit from the falling edge of the PWM signal from the primary input to the falling edge of the secondary side of the gate driver;

4. Rise time: the amount of time from 10% of the gate turn-off voltage (-4V) to 90% of the gate turn-on voltage (+18V);

5. Fall time: the amount of time from 90% of the gate turn-on voltage (+18V) to 10% of the gate turn-off voltage (-4V);

6. Creepage distance: refer to IEC61800-5-1-2007, meet the basic isolation requirements for altitudes below 2km and pollution level 2; this value takes the creepage distance of the isolation device.

7. Driver information transfer is an internal protocol, please refer to the 2FHD0620 datasheet for the specific NTC output method.

Ordering Information

The A1EDB1V have a variety of derivatives, If you have a purchase request, please add the module part number after the gate driver part number, and we can provide the gate driver that best meets your requirements.

Gate driver part number	Voltage level	$R_{GON}(\Omega)$	$R_{GOFF}(\Omega)$	$R_{SSD}(\Omega)$	Coating?
A1EDB1V-S0002	1700V	4.7/2	4.7/2	15	Yes
A1EDB1V-S0003	1700V	4.7/2	4.7/2	15	No

Technical Support

Firstack's professional team will provide you with business consultation and technical support. Please contact the Firstack technical sales team if you require the application manual for further information of the technical application.

Legal Disclaimer

This manual gives a detailed introduction about the product, but cannot promise to provide specific parameters. No warranty or guarantee, express or implied, is given herein as to the delivery, performance or applicability of the product.

Firstack reserves the right to modify technical data and product specifications at any time without prior notice. Firstack's general payment terms and conditions apply.

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