

2FHD0220 Data Sheet

Abstract

2FHD0220 series driver is a high-performance, dual-channel SiC gate driver developed in-house by Firstack based on ASIC platform, supporting single modules up to 2000V in the SiC 62mm housing module with configurable gate voltage. The driver supports up to 2W output per channel and is suitable for high power density application by using SiC module.

Core Features:

- Support 2W per channel
- Support up to 2000V SiC module
- Short-circuit protection(soft shut down)
- Miller clamping
- Configurable drive voltage
- Intelligent fault feedback
- UVLO

Typical Application:

- ESS
- Rail
- Motor drives

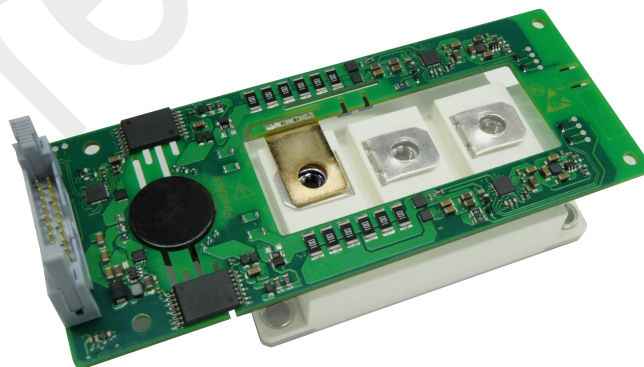


Fig. 1 2FHD0220C17B1

Functional Block Diagram

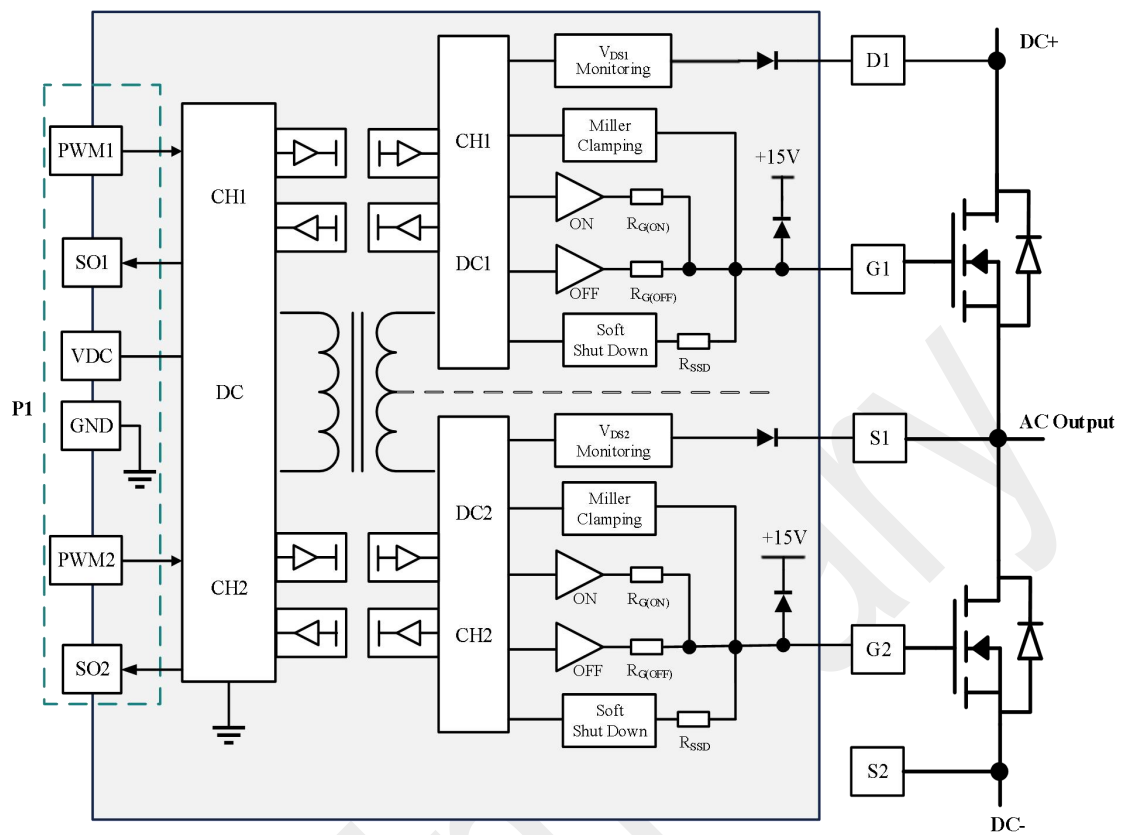


Fig. 2 Functional block diagram

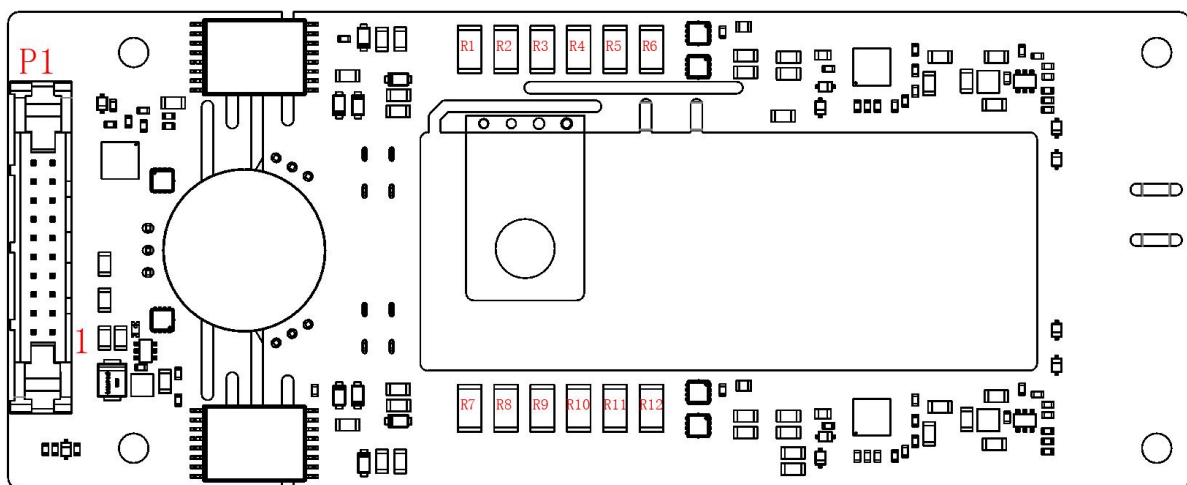


Fig.3 Connector interface location

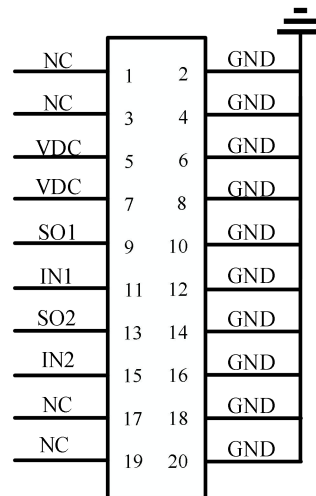
Resistors Replacement Instructions

Position	Definition
R1,R2,R3 & R7,R8,R9	ON
R4,R5,R6 & R10,R11,R12	Off

Installation

2FHD0220 has specific requirements for busbar design during installation. It is recommended that the distance between the busbar and the power terminals of the 62mm module be >10mm to ensure no interference between the busbar and the driver.

Connector Interface Definition



Pin Definition

Pin	Description	Function	Pin	Description	Function
1	NC	/	2	GND	Reference Ground
3	NC	/	4	GND	Reference Ground
5	V _{DC}	Power Supply	6	GND	Reference Ground
7	V _{DC}	Power Supply	8	GND	Reference Ground
9	SO1	Status Output 1	10	GND	Reference Ground
11	IN1	Signal Input 1	12	GND	Reference Ground
13	SO2	Status Output 2	14	GND	Reference Ground
15	IN2	Signal Input 2	16	GND	Reference Ground
17	NC	/	18	GND	Reference Ground
19	NC	/	20	GND	Reference Ground

Technical Parameters

Absolute Maximum Ratings

Parameter	Remarks	Min	Max	Unit
Supply voltage V_{DC}	V_{DC} to GND	0	15.5	V
Gate peak current	@85°C	-20	20	A
Output power per channel	@60°C		2	W
	@85°C		1	W
Test voltage (50Hz/1min)	Primary to secondary side	6000		V_{RMS}
Operating temperature		-40	85	°C
Storage temperature		-40	85	°C

Recommended Operating Conditions

Parameter	Remarks	Min	Typ	Max	Unit
Supply voltage V_{DC}	V_{DC} to GND	14.5	15	15.5	V
Supply current I_{DC}	Without load		0.18		A
Primary side undervoltage threshold			12		V
Secondary side undervoltage threshold	Secondary side positive voltage		12.5		V

Gate Driver Parameters

Output voltage	Remarks	Min	Typ	Max	Unit
Gate positive voltage V_{GSon}	Turn on (ON)	15	18	20.5	V
Gate negative voltage V_{GSoff}	Turn off (OFF)	-9.5	-4	-0.5	V

Logic Inputs & Outputs

Parameter	Remarks	Min	Typ	Max	Unit
Input PWM+ to PWM-	Note 1	5	15	V_{DC}	V
Turn on threshold PWM+ to PWM-			2.6		V

Turn off threshold PWM+ to PWM-			1.6	V
Fault output SOx	Protection state @Io<10mA	0.35	V _{DC}	V
MOD mode	Direct mode	Set by software, no configuration required		
	Half-bridge mode	Set by software, no configuration required		

Short-circuit protection

Parameter	Remarks	Min	Typ	Max	Unit
V _{DS} monitoring threshold	Short-circuit protection monitoring	Configurable	11	Configurable	V
Response time	CH1, Note 2	Configurable	1.5	Configurable	μs
	CH2, Note 2	Configurable	1.5	Configurable	μs
Soft shut down time	Soft shut down action time	Configurable	4.16	Configurable	μs

Miller Clamping

Parameter	Remarks	Min	Typ	Max	Unit
Time from drive signal turn-off to clamp turn-on		Configurable	1.04	Configurable	μs
Clamp voltage			V _{SS}		V

Timing Characteristics

Parameter	Remarks	Min	Typ	Max	Unit
Turn-on delay	Note 3		720		ns
Turn-off delay	Note 4		780		ns
Rise time	Note 5		10		ns
Fall time	Note 6		10		ns
Fault blocking time			78		μs
Fault return time	Note 7		10		ms

Electrical Isolation

Parameter	Remarks	Min	Typ	Max	Unit
Creepage distance	Primary to secondary side, Note 8		15		mm

Clearance distance	Secondary to secondary side, Note 8	12.5	mm
	Primary to secondary side	12	mm
	Secondary to secondary side	5.5	mm

Unless otherwise specified, all data are based on tests at +25°C ambient temperature and $V_{DC}=15V$.

Note:

1. Primary side input: both differential and single ended PWM signals are possible as input
 - 1.Single-ended input PWM- is grounded, voltage between PWM+ and PWM- typical +15V, PWM+ active high
2. Response time: the time from the occurrence of the fault to the start of soft shut down;
3. Turn-on delay: the time required to transmit the rising edge of the PWM signal input from the primary side to the rising edge of the secondary side of the gate driver;
4. Turn-off delay: the time required to transmit the falling edge of the PWM signal input from the primary side to the falling edge of the secondary side of the gate driver;
5. Rise time: the amount of time from 10% of the gate turn-off voltage to 90% of the gate turn-on voltage;
6. Fall time: the amount of time from 90% of the gate turn-on voltage to 10% of the gate turn-off voltage;
7. Fault return time: short-circuit 10ms, secondary side undervoltage 20ms, primary side undervoltage 40ms;
8. Creepage distance: refer to IEC61800-5-1-2007, to meet the basic insulation requirements of 2km or less above sea level and pollution level 2; the value is taken as the creepage distance of the isolation device.

Updates

Date	Description	Version
2025.11.03	Official Version	V1.0
2025.12.11	Add installation note	V1.1

Ordering Information

2FHD0220 can support different part number of modules from multiple manufacturers. When purchasing, please add the module part number after the driver model number so that we can provide the driver that best meets your needs.

Part Number	Voltage	V _{GS}	R _{GON} (Ω)	R _{GOFF} (Ω)	Coating
2FHD0220C17B1-S0001	2000V	+18V/-4V	10//10//10	10//10//10	No
2FHD0220C17B1C-S0001	2000V	+18V/-4V	10//10//10	10//10//10	Yes

Technical Support

Firstack's professional team will provide you with business consultation, technical support, product selection, price, lead time and other related information, and guarantee to answer your questions within 48 hours.

Legal Disclaimer

The instruction manual provides a detailed description of the product but does not commit to providing specific parameters regarding the delivery, performance, or applicability of the product. This document does not offer any express or implied warranties or guarantees.

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