2FHD0420V Data Sheet

Abstract

2FHD0420V 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 1700V in the SiC EconoDual™ or equivalent 17mm housing module with configurable gate voltage. The driver supports up to 4W output per channel and is suitable for high switching frequency applications (>50kHz) using SiC modules.

Core Features:

- Switching Freq.>50kHz
- Support up to 1700V SiC module
- Short-circuit protection(soft shut down)
- Miller clamping
- Configurable drive voltage
- Intelligent fault feedback
- UVLO

Typical Application:

- ESS
- Rail
- Motor drives

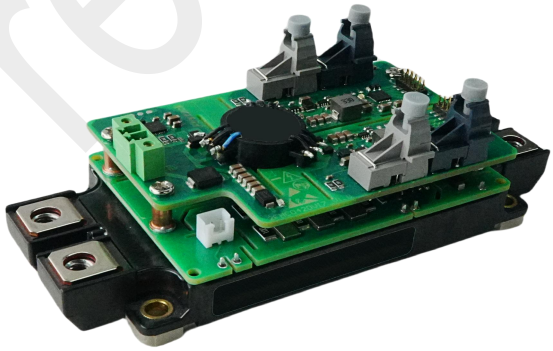


Fig. 1 2FHD0420V

Functional Block Diagram

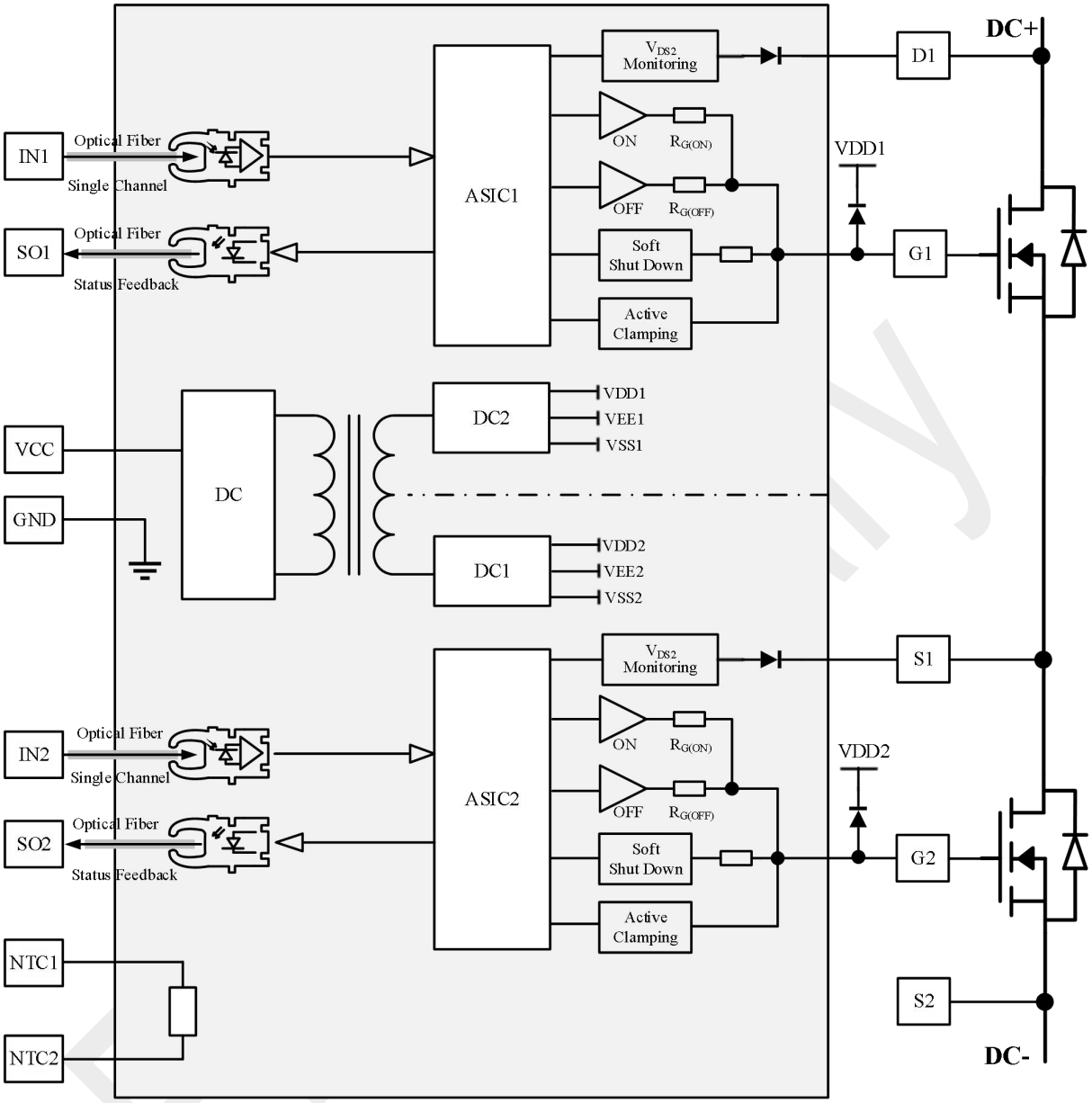
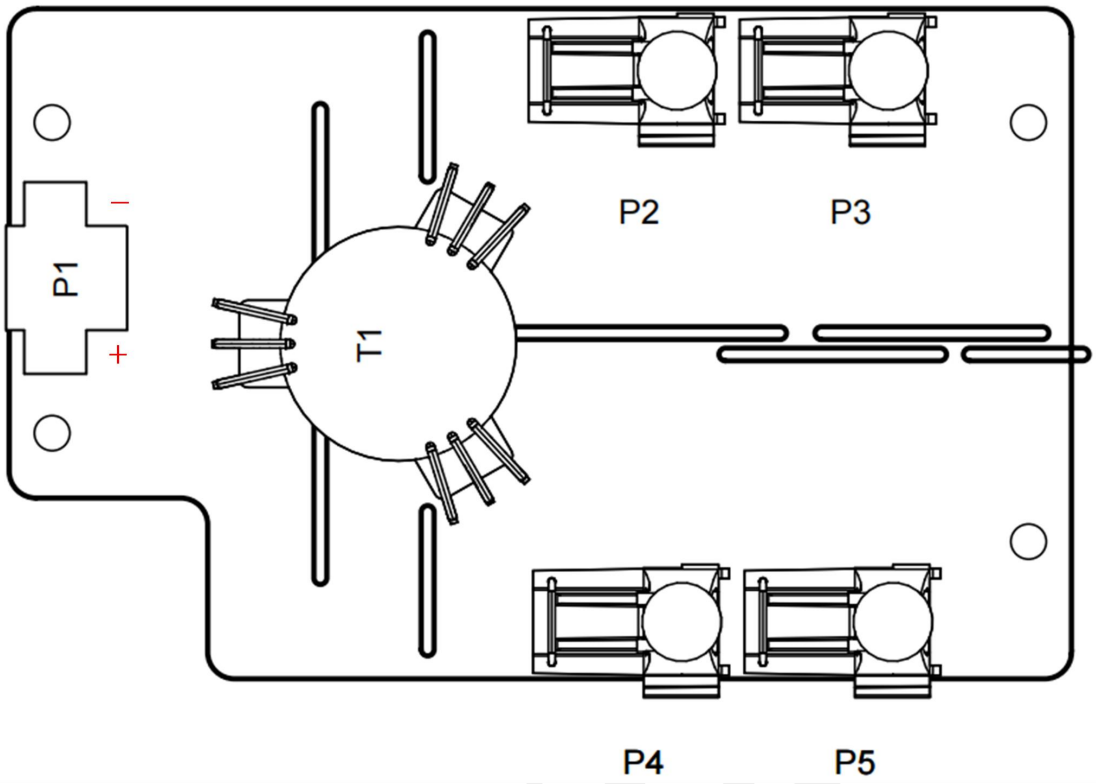


Fig. 2 Functional block diagram



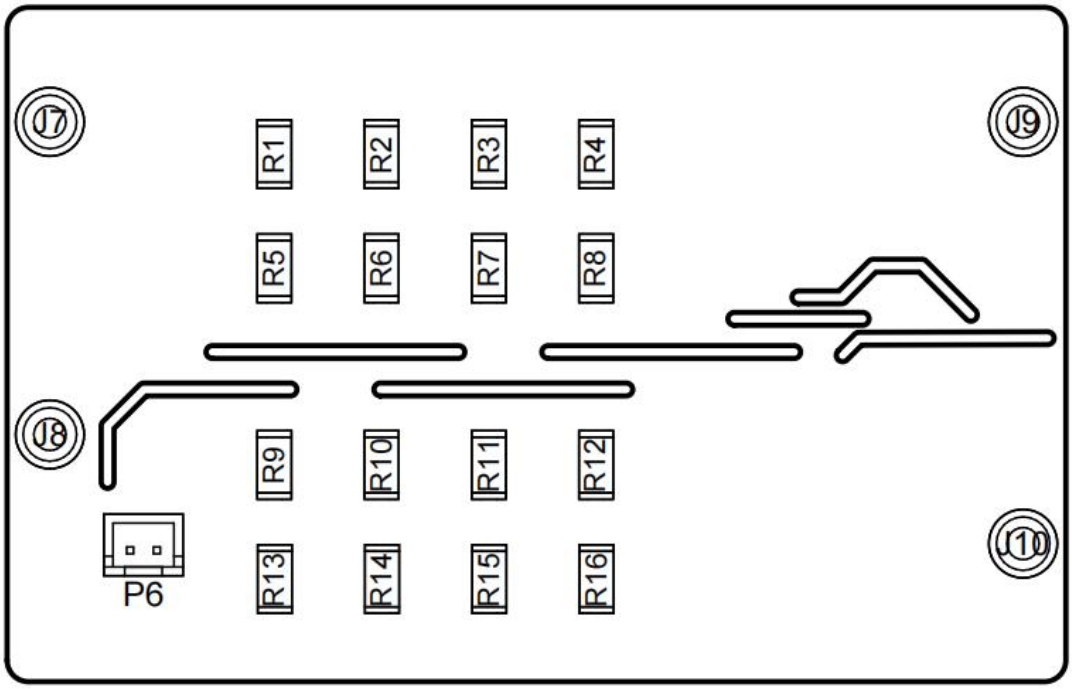


Fig. 3 Connector interface location

Resistors Replacement Instructions

Position	Definition
R1, R2, R3, R4 & R9, R10, R11, R12	ON
R5, R6, R7, R8 & R13, R14, R15, R16	OFF

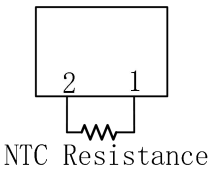
Power Terminal

Position	Definition	Part Number
P1	15V Power Input	SERIE 3233 - 3.81MM

Optical Fiber

Position	Definition	Part Number
P2,P4	BOT/TOP SOx Output	HFBR1531ETZ
P3,P5	BOT/TOP PWM Input	HFBR2531ETZ

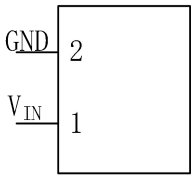
NTC Interface



Definition	Vendor	Part Number	Recommend Terminal
NTC terminal	JST	(G)B2B-XH-A(LF)(SN)(P)	XHP-2

Note: NTC interface is not processed, need to design peripheral circuits

Connector Interface Definition



P1 terminal pin designation

Pin	Definition	Function	Pin	Definition	Function
1	V_{IN}	15V Input	2	GND	Primary side 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℃	-20	20	A
Output power per channel	@50℃		4	W
Test voltage (50Hz/1min)	Primary to secondary side	6000		V_{RMS}
Operating temperature		-40	85	℃
Storage temperature		-40	85	℃

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		0.16		A
Coupling capacitor C_{IO}	Primary to secondary side		/		pF

Primary side undervoltage threshold	Supply voltage		12.5		V

Gate Driver Parameters

Output voltage	Remarks	Min	Typ	Max	Unit
Total gate voltage	Turn on (ON) - off (OFF) voltage	19.5	22	25.5	V
Gate positive voltage V_{GSon}	Turn on (ON)	14.5	18	20.5	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 monitoring	Configurable	11	Configurable	V
Response time	CH1, Note 1	Configurable	1.5	Configurable	μs
	CH2, Note 1	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
Time from clamp turn-off to drive signal turn-on			300		ns
Clamp voltage			V_{SS}		V

Timing Characteristics

Parameter	Remarks	Min	Typ	Max	Unit
Turn-on delay	Note 2		500		ns
Turn-off delay	Note 3		700		ns
Rise time	Note 4		9		ns
Fall time	Note 5		9		ns

Fault blocking time		200		250	μs
Fault return time	Note 6	77		80	ms
Edge Feedback			700		ns

Electrical Isolation

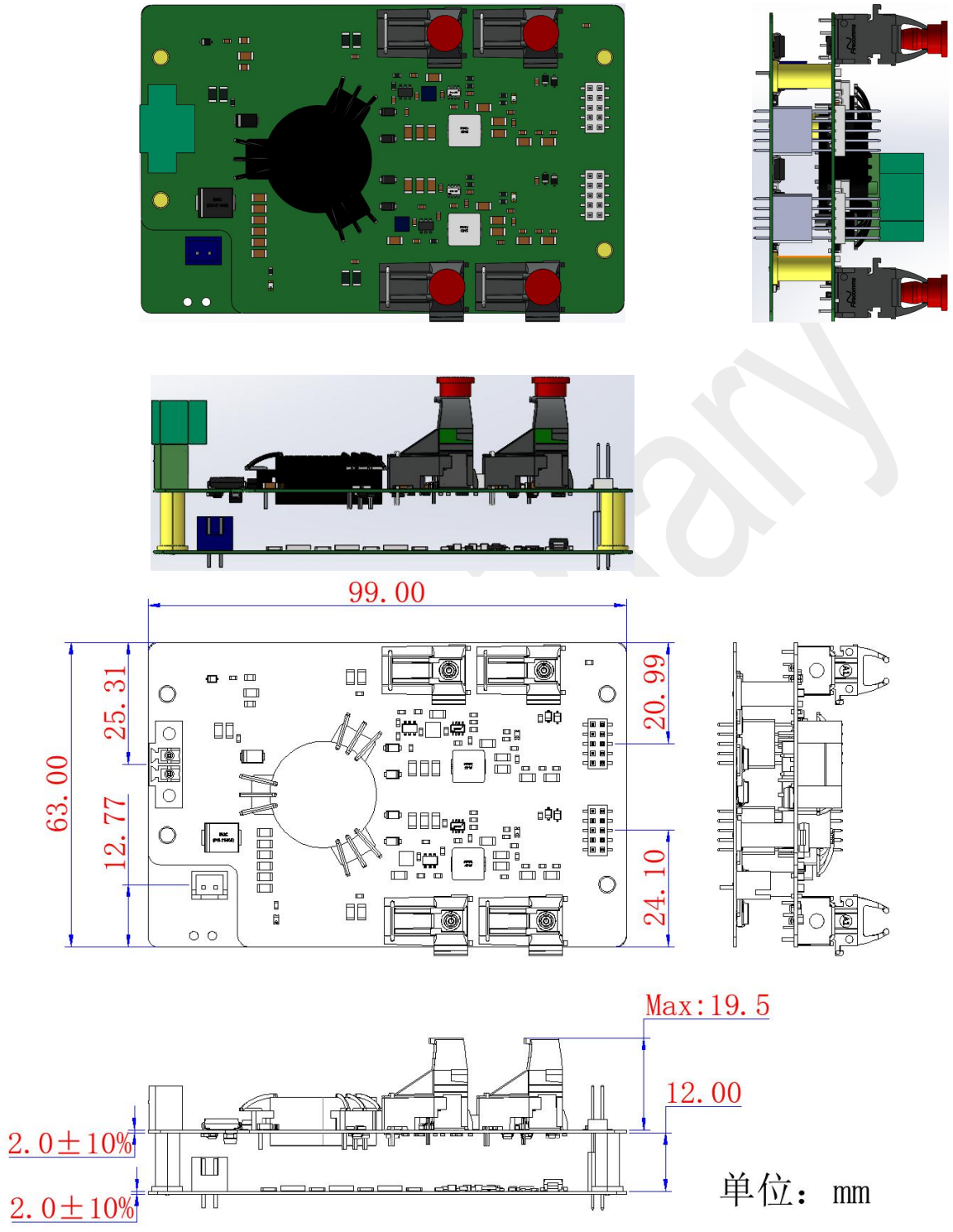
Parameter	Remarks	Min	Typ	Max	Unit
Creepage distance	Primary to secondary side, Note 8		15		mm
	Secondary to secondary side, Note 8		12		mm
Clearance distance	Primary to secondary side		8		mm
	Secondary to secondary side		4.5		mm

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

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 the rising edge of the PWM signal input from the primary side to the rising edge of the secondary side of the gate driver;
3. 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;
4. Rise time: the amount of time from 10% of the gate turn-off voltage to 90% of the gate turn-on voltage;
5. Fall time: the amount of time from 90% of the gate turn-on voltage to 10% of the gate turn-off voltage;
6. Fault return time: short-circuit 10ms, secondary side undervoltage 20ms, primary side undervoltage 40ms;

3D and Mechanical Dimensions



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

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

Fig. 4 3D Mechanical Dimensions (unit: mm)

Updates

Date	Description	Version
2025.06.17	Official Version	V1.0
2025.07.24	Ordering Information update	V1.1

Ordering Information

2FHD0420V 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
2FHD0420V17A1-S0001	1700V	18V/-4V	10/4	12/4	W/O

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.

Firstack reserves the right to modify technical data and product specifications at any time without prior notice. The general delivery terms and conditions of Firstack apply.

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