2FHC0215xV Data Sheet

Abstract

The 2FHC0215xV is a high performance, dual-channel driver core developed by Firstack based on intelligent chip technology. It supports IGBT modules up to 1700V. The peripheral application circuit is simple, which means customers can drive the IGBT safely and reliably without investing in debugging the driver core.

Highlights:

- 2W/15A, support up to 30kHz applications
- Support up to 1700V module
- Short-circuit protection(soft shut down)
- Support multi-level applications

Applications:

- Motor drives
- ESS

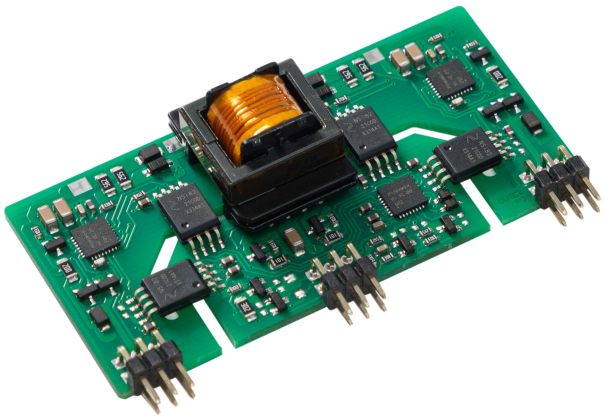


Fig.1 2FHC0215xV

Functional Block Diagram

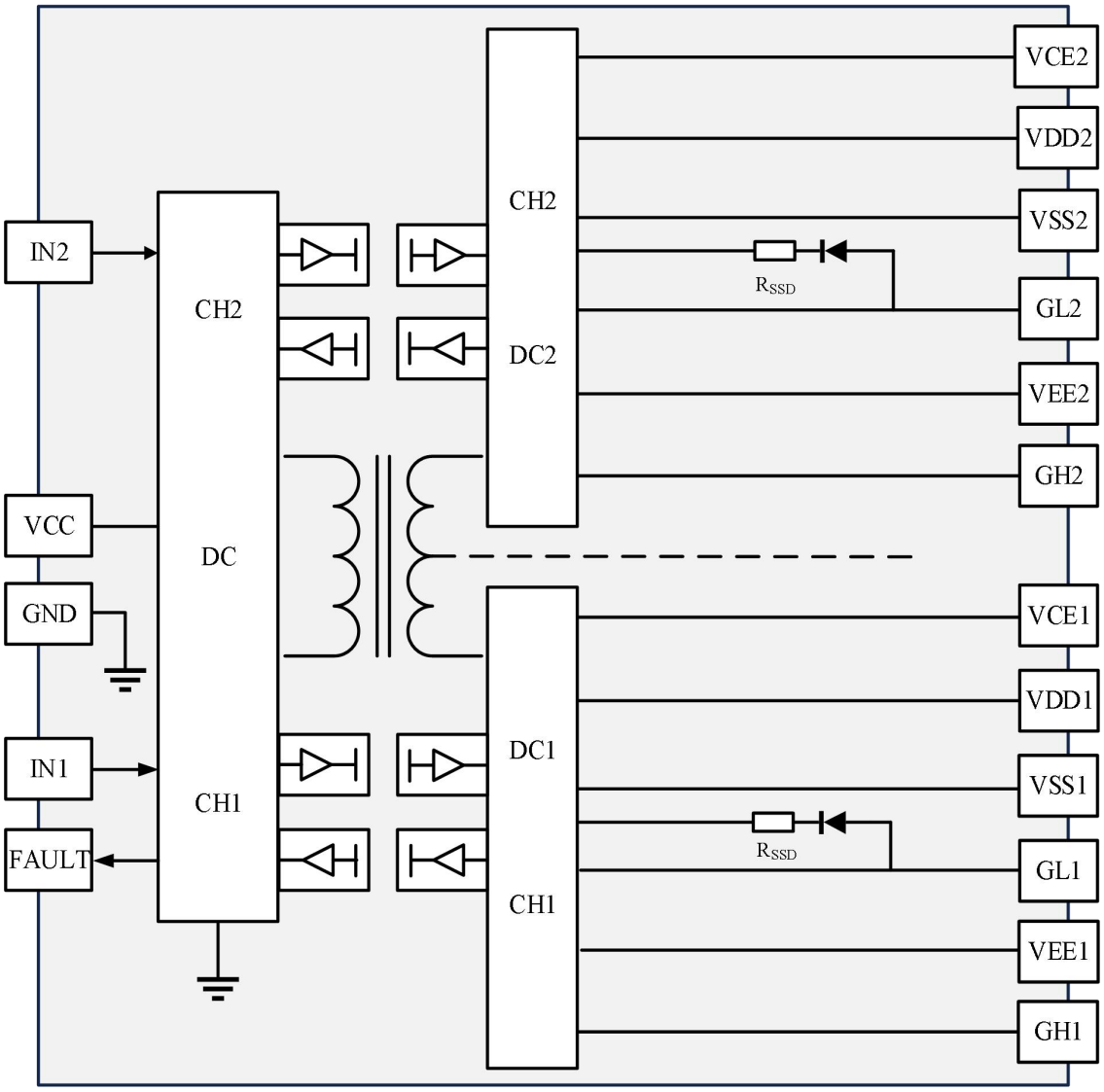
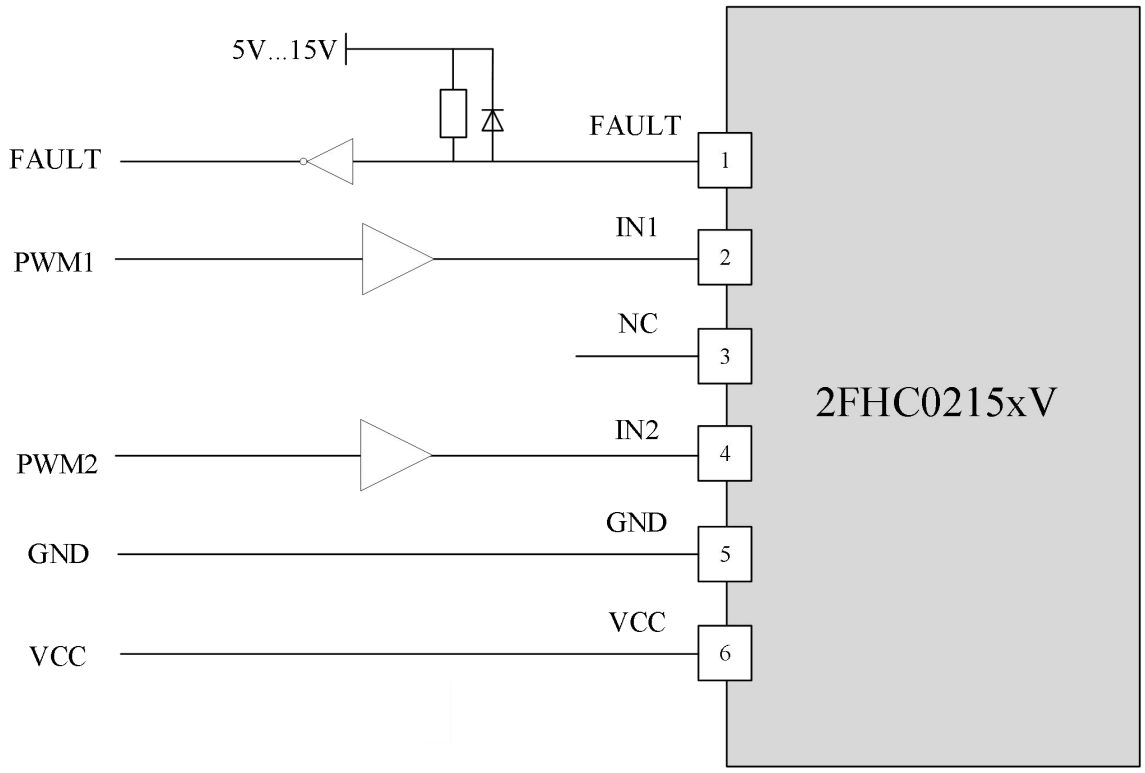


Fig.2 Functional block diagram

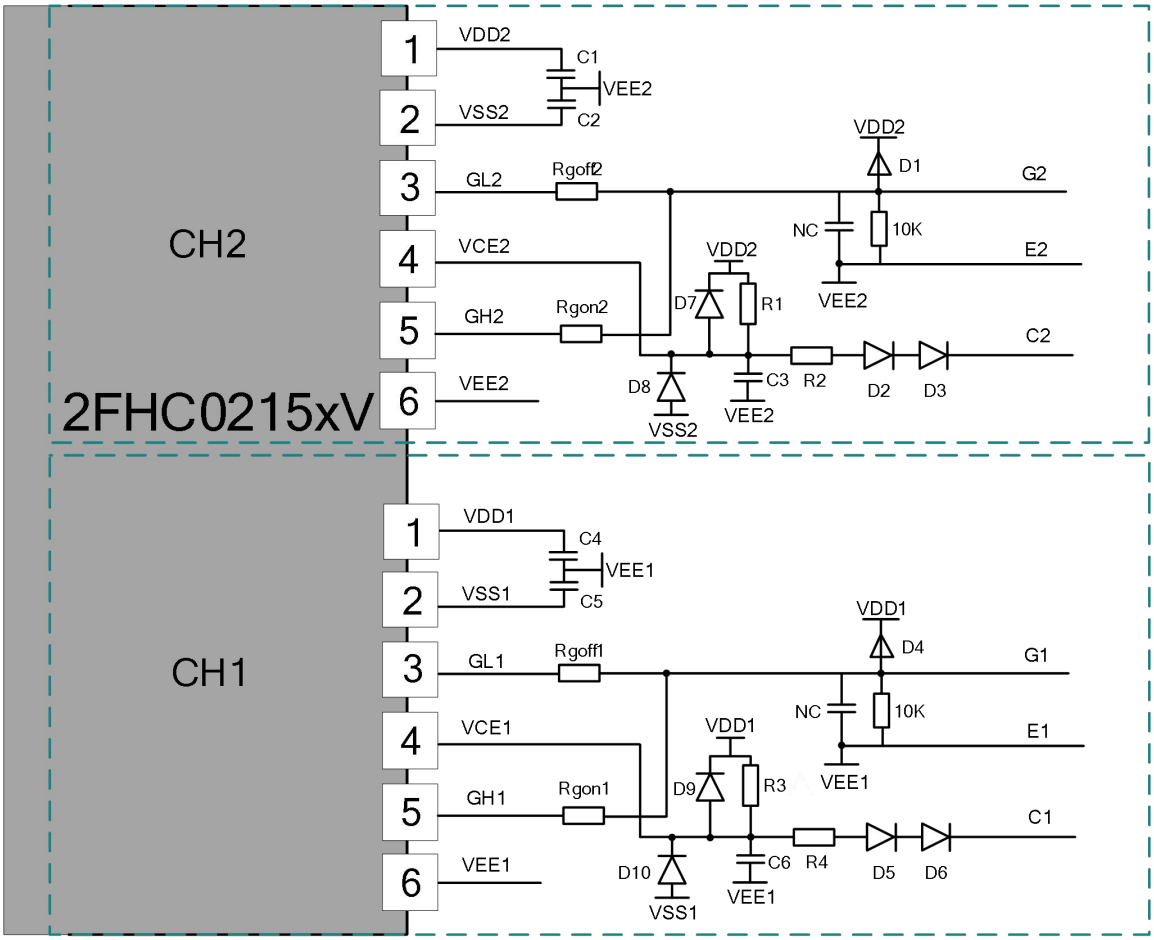
Recommended Interface Circuitry for the Primary Side Connector



Primary side P2 interface definition

Pin	Definition	Function	Pin	Definition	Function
1	FAULT	Fault output channel	2	IN1	Signal input channel 1
3	NC	Free	4	IN2	Signal input channel 2
5	GND	Ground	6	VCC	Supply voltage, 15V supply for primary side

Recommended Interface Circuitry for the Secondary Side Connector



Secondary side P1 interface definition

Pin	Definition	Function	Pin	Definition	Function
1	VDD2	Positive supply channel 2	2	VSS2	Negative supply channel 2
3	GL2	Gate low channel 2; pulls gate low through tum-off resistor	4	VCE2	V_{CE} sense channel 2
5	GH2	Gate high channel 2; pulls gate high through tum-on resistor	6	VEE2	Emitter (ground) channel 2

Secondary side P3 interface definition

Pin	Definition	Function	Pin	Definition	Function
1	VDD1	Positive supply channel 1	2	VSS1	Negative supply channel 2
3	GL1	Gate low channel 1; pulls gate low through tum-off resistor	4	VCE1	V_{CE} sense channel 1
5	GH1	Gate high channel 1; pulls gate high through tum-on resistor	6	VEE1	Emitter (ground) channel 1

Technical Parameters

Absolute Maximum Ratings

Parameter	Remarks	Min	Max	Unit
Power supply V_{DC}	V_{DC} to GND	0	15.5	V
Logic input and output voltages	Primary side, to GND	0	V_{DC}+0.5V	V
Output power per channel	@85℃		2.0	W
Gate peak current	@85℃	-15	15	A
Test voltage (50Hz/1min)	Primary to secondary side	5000		V_{RMS}
Maximum DC bus voltage	2FHC0215xV		1200	V
Operating temperature		-40	85	℃
Storage temperature		-40	90	℃

Recommended Operating Conditions

Parameter	Remarks	Min	Typ	Max	Unit
Power supply V_{DC}	V_{DC} to GND	14.5	15	15.5	V
Supply current I_{DC}	Without load		0.1		A
Coupling capacitance C_{IO}	Primary to secondary side		10		pF
Supply undervoltage threshold V_{DC}	Primary side		12		V

Gate Driver Parameters

Output level	Remarks	Min	Typ	Max	Unit
Gate voltage V_{GE}	Turn on (ON)	14.5	15	15.5	V
Gate voltage V_{GE}	Turn off (OFF)	-9.5	-8.5	-7.5	V

Logic Inputs & Outputs

Parameters	Remarks	Min.	Typ.	Max.	Unit
Input signal INx	INx to GND	4.5	15	15.5	V
Input impedance			10		kΩ
Turn-on threshold	V(INx)	3.2			V
Turn-off threshold	V(INx)			1.1	V
Fault output SOx	Protection state @Io<10mA		OD		

Short-Circuit Protection

Parameter	Remarks	Min	Typ	Max	Unit
V_{CE} monitoring threshold	Short-circuit monitoring threshold		10		V
Response time	CH1, Note 1		6.7		µs
	CH2, Note 1		8.5		µs
Soft shut down time	Soft shut down action time		4.16		µs

Timing Characteristics

Parameter	Remarks	Min	Typ	Max	Unit
Turn-on delay	Note 2		650		ns
Turn-off delay	Note 3		750		ns
Rise time	Note 4		10		ns
Fall time	Note 5		10		ns
Fault blocking time			80		ms
Fault return time			5		ms

Electrical Isolation

Parameter	Remarks	Min	Typ	Max	Unit
Creepage distance	Primary to secondary side, Note 6	8			mm
	Secondary to secondary side, Note 6	6.5			mm
Clearance distance	Primary to secondary side	8			mm
	Secondary to secondary side	5.5			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, the response time can be increased by peripheral circuit filtering;
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 (-8.5V) to 90% of the gate turn-on voltage (+15V);
5. Fall time: the amount of time from 90% of the gate turn-on voltage (+15V) to 10% of the gate turn-off voltage (-8.5V);
6. Creepage distance: refer to IEC61800-5-1-2007, meet the basic isolation requirements for altitudes below 2km and pollution level 2.

3D and Mechanical Dimensions

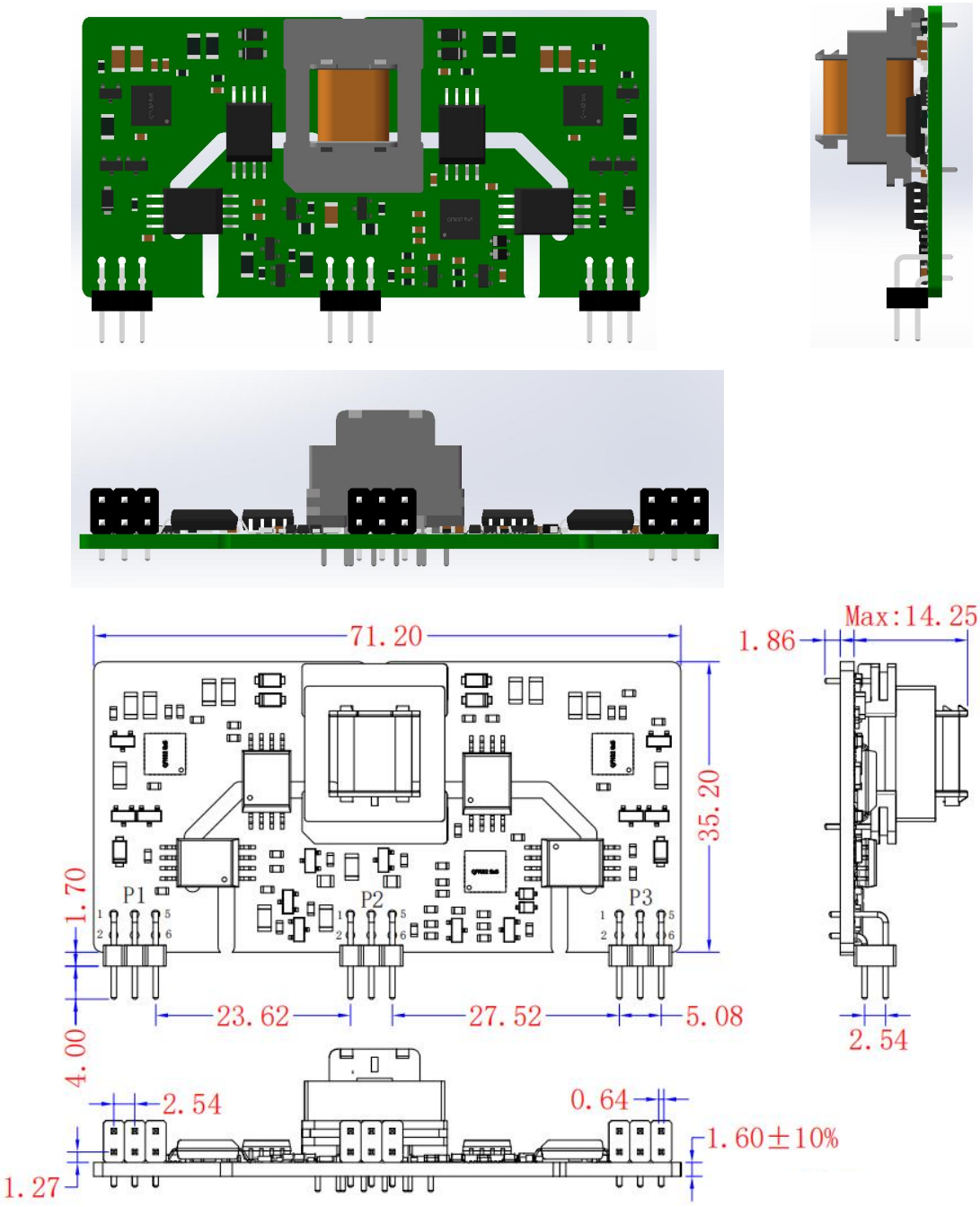


Fig.3 3D and mechanical dimensions (unit: mm)

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

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

Recommended dimensions

Serial number	Recommended pin pad size	Recommended through-hole size
1	Φ=2mm	Φ=1.02mm

Ordering Information

The 2FHC0215 is the general gate driver core and supports different part numbers of modules from multiple manufacturers.

Part number	INx	SOx	IGBT voltage
2FHC0215C17B1V	5-15V	OD	1700V

Note: For 3-level applications, it must be configured: CH1 for the outer IGBT and CH2 for the inner IGBT.

Inner and outer IGBT fault sequence turn-ff logic of 3-level applications:

The 2FHC0215C17B1V enables sequence soft shut down of inner and outer IGBTs during fault conditions.

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.

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