4FHP0435PM77N-Y0100 Data Sheet

Abstract

The 4FHP0435PM77N-Y0100 is a high-performance 4-channel driver solution developed by Firstack based on ASIC digital control technology for small and medium energy storage field, which only supports applications of SKMI1200MLI12BE4, SKMI1200MLI12TE4, SKM1400MLI12BM7 and SKM1400MLI12TM7 modules.

Highlights:

- 4W/35A, 4 channels
- Support up to 1200V modules
- Short-circuit protection (soft shut down)
- Fault sequence

Applications:

- ESS

Fig. 1 4FHP0435PM77N-Y0100

Functional Block Diagram

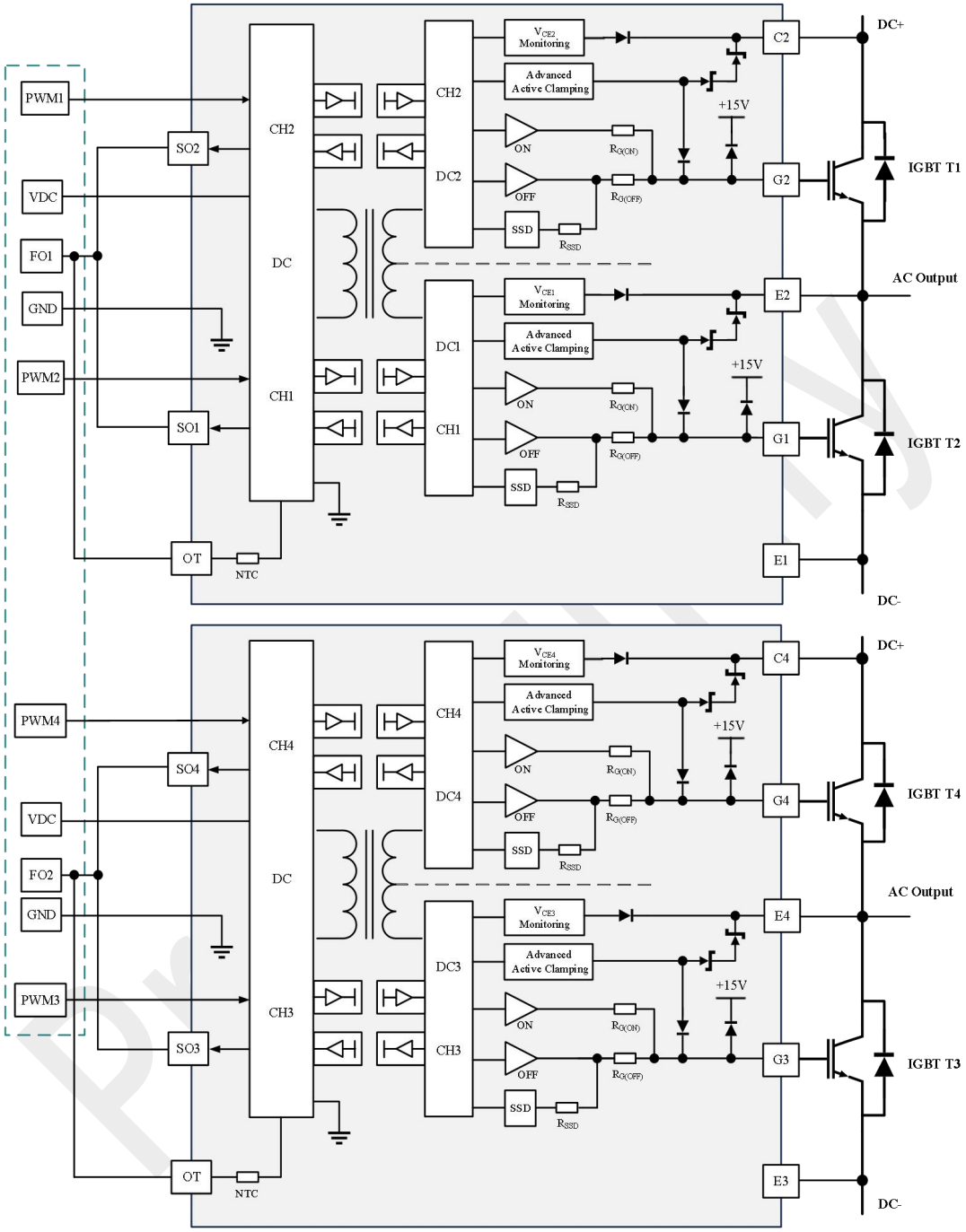


Fig.2 Functional block diagram

Pin Designation

Pin	Definition	Function	Pin	Definition	Function
1	VDC	Primary side supply +15V	2	VDC	Primary side supply +15V
3	GND	Primary side ground	4	GND	Primary side ground
5	GND	Primary side ground	6	PWM1	T1 input signal(high turn on, low turn off)
7	GND	Primary side ground	8	PWM2	T2 input signal(high turn on, low turn off)
9	GND	Primary side ground	10	PWM3	T3 input signal(high turn on, low turn off)
11	GND	Primary side ground	12	PWM4	T4 input signal(high turn on, low turn off)
13	GND	Primary side ground	14	GND	Primary side ground
15	FO1	T1&T2 fault return(high normal, low fault)	16	GND	Primary side ground
17	FO2	T3&T4 fault return(high normal, low fault)	18	GND	Primary side ground
19	GND	Primary side ground	20	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
Logic input and output voltages	Primary side, to GND	0	15.5	V
SOx current	Fault condition	0	10	mA
Output power per channel	@85℃		4	W
Gate peak current	@85℃	-35	35	A
Test voltage(50Hz/1min)	Primary to secondary side	5000		V_{RMS}
	Secondary to secondary side	4000		V_{RMS}
DC bus voltage			1500	V
Operating temperature		-40	85	℃
Storage temperature		-40	90	℃

Power Supply

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		0.22		A
Coupling capacitance C_{IO}	Primary to secondary side		18		pF
Supply undervoltage threshold	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)	-7	-8	-9	V

Logic Inputs & Outputs

Parameter	Remarks	Min	Typ	Max	Unit
Input signal INx	INx to GND		15	15.5	V
Input impedance	To GND		10		kΩ
Turn-on threshold	V(INx)	6.8			V
Turn-off threshold	V(INx)			6.6	V
Fault output SOx	Protection state @ Io<10mA			0.35	V

Short-circuit Protection

Parameter	Remarks	Min	Typ	Max	Unit
V_{CE} monitoring threshold	Short-circuit monitoring threshold @Rthx=68KΩ		10.1		V
Response time	T1&T4, Note 1		6.2		μs
	T2&T3, Note 1		9.5		μs
Soft shut down time	Soft shut down action time		10.4		μs

Timing Characteristics

Parameter	Remarks	Min	Typ	Max	Unit
Turn-on delay	Note 2		650		ns
Turn-off delay	Note 3		650		ns
Rise time	Note 4		10		ns

Fall time	Note 5	20	ns
Fault blocking time	Secondary side gate blocking signal	80	ms
Fault return time	Fault low level time, Note 6	10	ms

Electrical Isolation

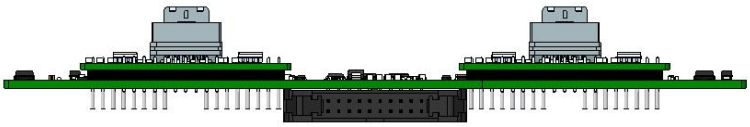
Parameter	Remarks	Min	Typ	Max	Unit
Creepage distance, Note 7	Primary to secondary side, Note 8	8			mm
	Secondary to secondary side	12			mm
Clearance distance	Primary to secondary side, Note 8	8			mm
	Secondary to secondary side	6.5			mm

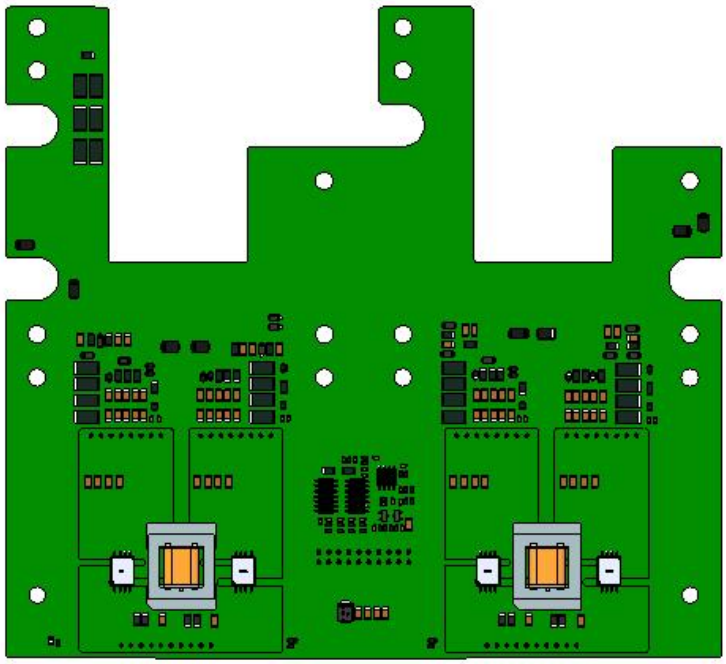
Unless otherwise specified, all data are based on tests at +25℃ ambient temperature and V_{DC}=15V.

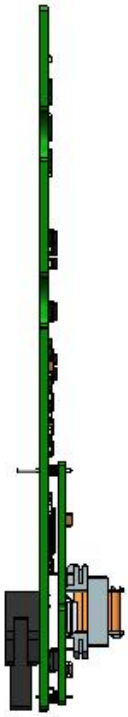
Note:

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 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 (-8V) 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 (-8V);
6. Fault return time: short-circuit=10ms, secondary side undervoltage=20ms, primary side undervoltage =40ms;
7. Creepage distance: refer to IEC61800-5-1-2007, meet the basic isolation requirements for altitudes below 2km and pollution level 2;
8. This value takes the creepage distance of the isolation device.

3D and Mechanical Dimensions







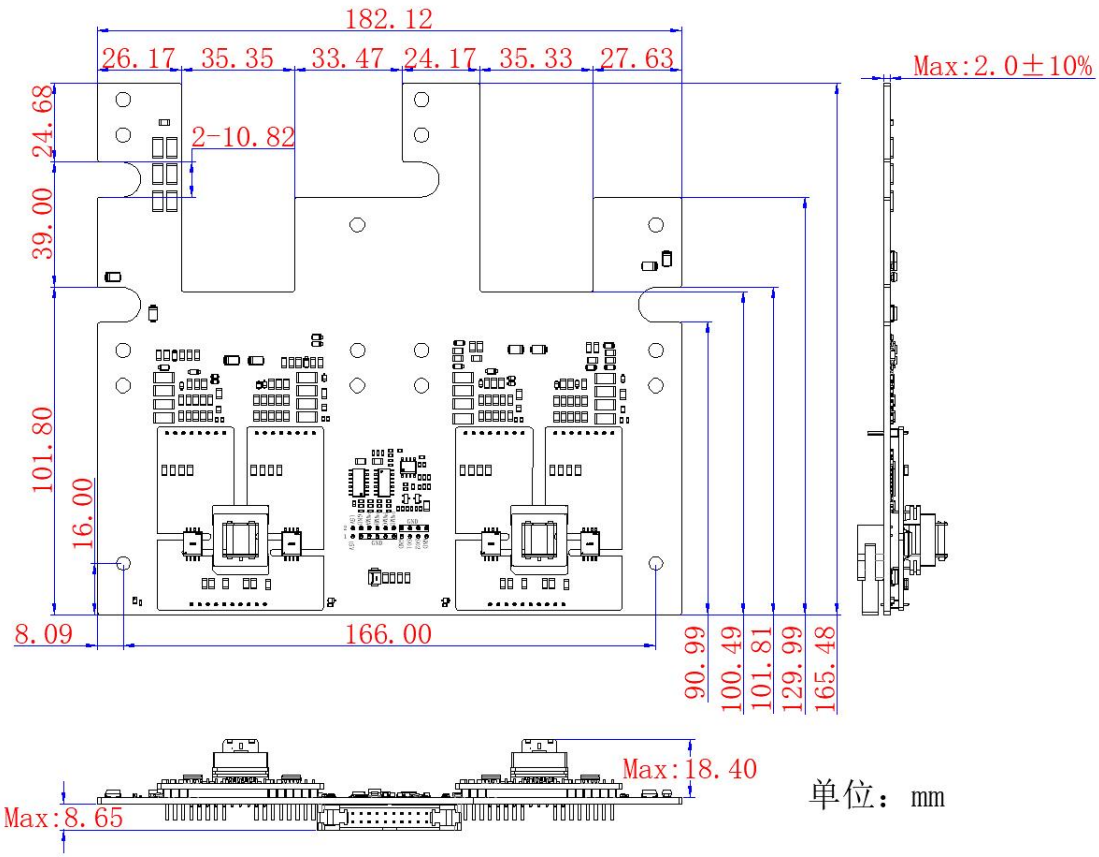


Fig.3 3D and mechanical dimensions (unit: mm)

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

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

Ordering Information

The 4FHP0435PM77N-Y0100 only supports the applications of SKMI1200MLI12BE4, SKMI1200MLI 12TE4, SKM1400MLI12BM7 and SKM1400MLI12TM7 modules.

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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Contact Information

Tel: +86-571 8817 2737

Fax: +86-571 8817 3973

Website: www.firstack.com

Email: fsales@firstack.com

Address: 4-5/F, Building/5, Xizi Wisdom Industrial Park, No.1279 Tongxie Road, Hangzhou, China