

FS06P Series Data Sheet

Abstract

FS06P series is Firstack's self-developed 6.5kV_{DC}/6W isolated drive power module with plate transformer, which increases the power density, provides safe and reliable drive power for SiC/Si-MOSFET/IGBT and support different package style.

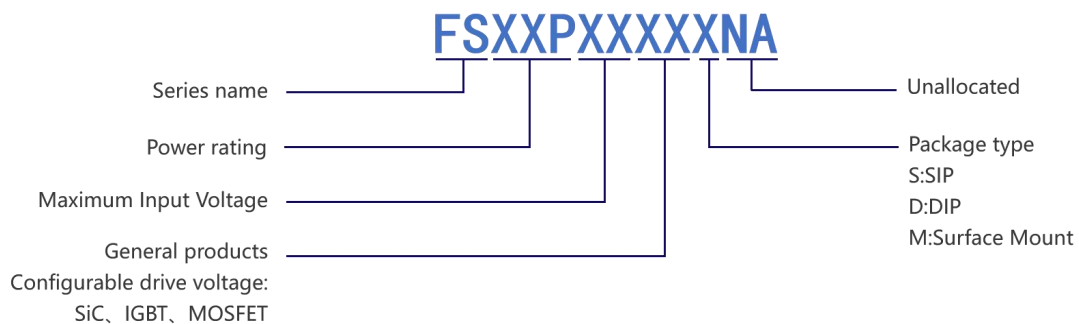
Core Features:

- Test Voltage 6.5kV_{DC}
- Max. Output Power 6W
- Wide Range Input: 9-18V
- Configurable Output: MOSFET:+15V/-5V; IGBT:+15V/-10V; SiC:+20V/-5V
- Comprehensive Protection
- Coupling Capacitance 8pF

Typical Application:

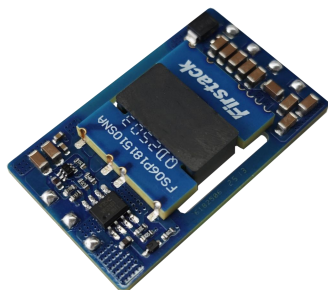
- ESS
- Industrial Drives
- Photo Voltaic System
- Railway Traction

Naming Structure

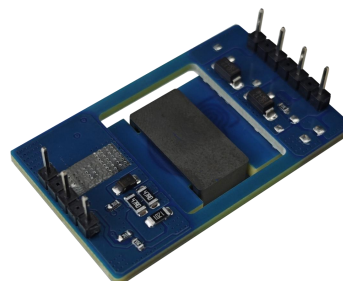


Package Style

1.DIP



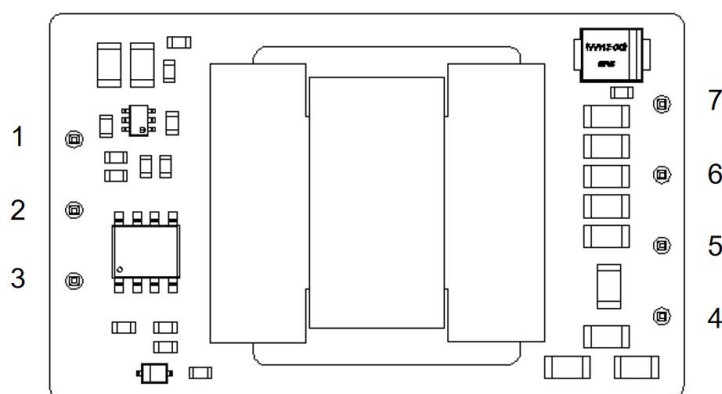
FS06P18GPDNA(front)



FS06P18GPDNA(back)

Pin Definition

Pin	Description	Note
1	V _{in} +	Typical Input 12V (9-18V)
2	V _{EN}	Vacant enables FS06P, pull low to disable FS06P
3	V _{in} -	Ground to Input
4	5V _b _GND	5V _b -
5	5V _a _GND/5V _b	5V _a -/5V _b +
6	15V _o _GND/5V _a	15V-/5V _a +
7	15V _o	15V+



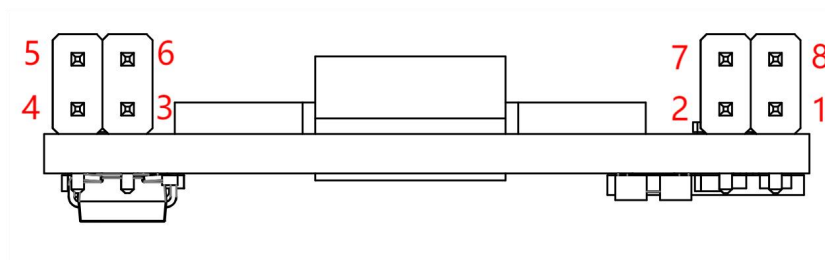
2.SIP



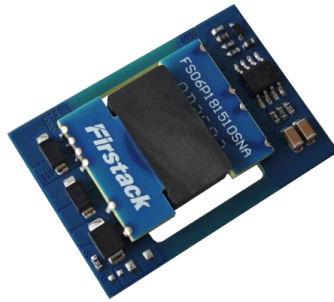
FS06P18GPSNA

Pin Definition

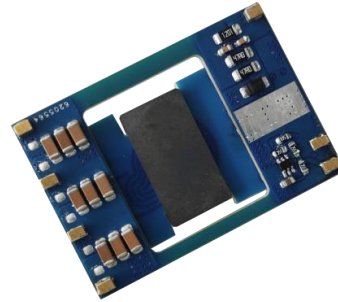
Pin	Description	Note
1	VEN	Vacant enables FS06P, pull low to disable FS06P
2	Vin+	Typical Input 12V (9-18V)
3	15Vo	15V+
4	5Vb_GND	5Vb-
5	5Va_GND/5Vb	5Va-/5Vb+
6	15Vo_GND/5Va	15V-/5Va+
7	Vin-	Ground to Input
8	Vin-	Ground to Input



3.Surface Mount



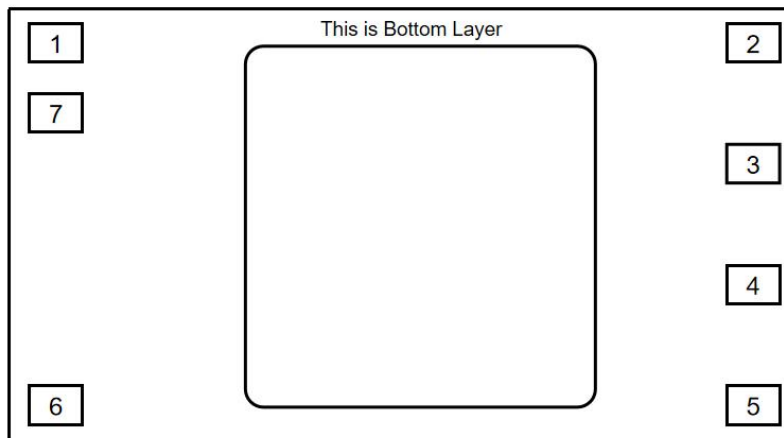
FS06P18GPMNA(TOP)



FS06P18GPMNA(BOT)

Pin Definition

Pin	Description	Note
1	VEN	Vacant enables FS06P, pull low to disable FS06P
2	5Vb_GND	5Vb-
3	5Va_GND/5Vb	5Va-/5Vb+
4	15Vo_GND/5Va	15V-/5Va+
5	15Vo	15V+
6	Vin+	Typical Input 12V (9-18V)
7	Vin-	Ground to Input



Technical Characteristics

Part No.	Input	Application	Positive Output			Negative Output					
			Voltage	Current	Power	Voltage	Current	Power			
FS06P	V		V	mA	W	V	mA	W			
		IGBT	+15	240	3.6	-10	240	2.4			
		SiC	+20	240	4.8	-5	240	1.2			
		MOSFET	+15	300	4.5	-5	300	1.5			
	9-18	Performance	Load Regulation ¹		Ripple& Noise ²	Load Regulation ¹		Ripple&Noise ²			
			%		mVp-p	%		mVp-p			
			Typ.	Max.	Typ.	Max.	Typ.	Max.	Typ.	Max.	
			IGBT	3	5	110	150	3	5	60	100
			SiC	3	5	110	150	3	5	60	100
			MOSFET	3	5	110	150	3	5	60	100

Note 1: 50%-100% load regulation;

Note 2: Refer to the ripple test method, bandwidth limited to 20MHz.。

Input Characteristics

Parameters	Condition	Min.	Typ.	Max.	Unit
Input Range		9	12	18	V
Input Ripple Current	100% load		170		mA
	V _{EN} pull low		0.5		mA
V _{EN} ¹	Pull up	2		60	V
	Pull low	-1	0	0.5	V

Note 1: V_{EN} is a high impedance TTL input, so care should be taken during the layout to avoid noise effects.

Output Characteristics

Parameters	Condition	Min.	Typ.	Max.	Unit
Minimum Load	Without load, 15V _{output} and 5V _{output} are clamped to 15.5V/6.0V respectively	1			%
Voltage Accuracy	Output Positive		1		%
	Output Negative		4		%
Linear Regulation	9V _{in} →18V _{in} , 50% load			2	%
Load Regulation	1% load→100% load			5	%
Transient Response	Peak deviation (50%-100% load)		3		%
	Settling Time		0.3		ms

General Characteristics

Parameters	Condition	Min.	Typ.	Max.	Unit
Switching Freq.	100% load			360	kHz
Voltage Delay	Delay between input and output		3.5		ms

Isolation Characteristics

Parameters	Condition	Min.	Typ.	Max.	Unit
Test Voltage	1 min. Leakage current <1mA	6500			VDC
Insulation Resistance	1kV _{DC}	100			GΩ
Safety Standard	Creepage distance & Clearance distance 8mm				

Protection Characteristics

Parameters	Condition	Min.	Typ.	Max.	Unit
Input UVLO	Protection threshold		7.5		V
Input OVLO	Protection threshold		21.5		V
Over-current Protection	Protection threshold under 25V		0.3		A
Over-temperature Protection	Protection threshold		160		°C

Temperature Characteristics

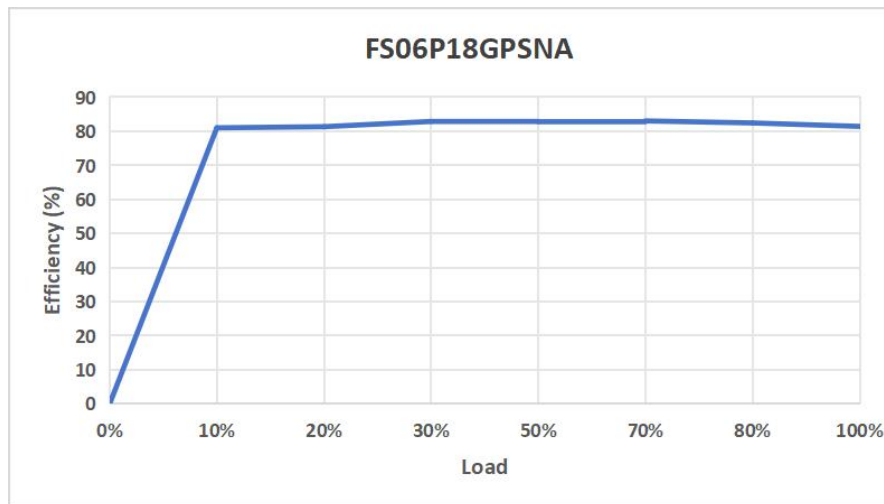
Parameters	Condition	Min.	Typ.	Max.	Unit
Operation Temp.	Refer to derating curve	-40		105	°C
Storage Temp.		-50		125	°C
Temp. rise above ambient	12V _{IN} , 6W, 25°C, no wind		40		°C

Absolute Maximum Ratings

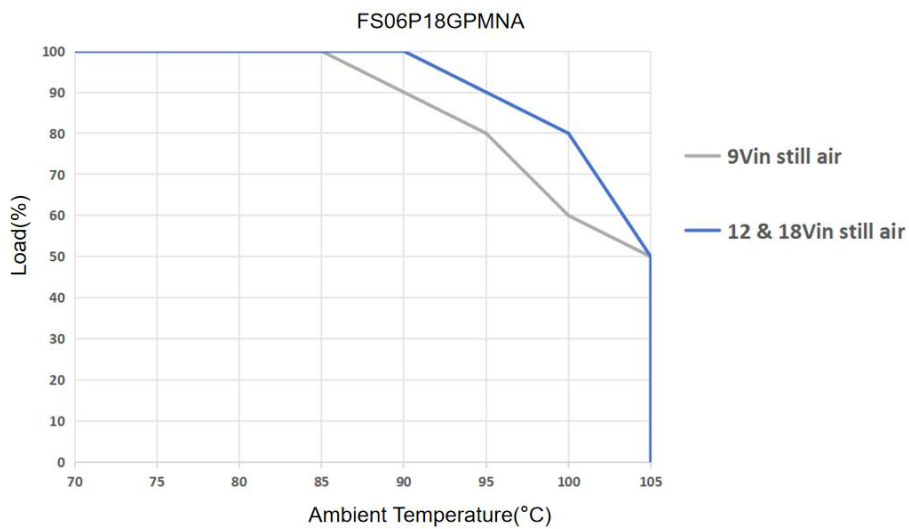
Parameters	Condition	Min.	Typ.	Max.	Unit
Capacitive Load	20V			220	uF
	15V			330	
	-10V			330	
	-5V			490	
Input Voltage	21.5V-35V enables OVLO	-0.3		35	V
Wave Soldering	Wave soldering profile won't exceed the profile recommended in IEC 61760-1				

Note: Unless otherwise specified, the above parameter characteristics are based on 12V input and 25°C ambient temp. test.

Efficiency VS Load



Derating Curve



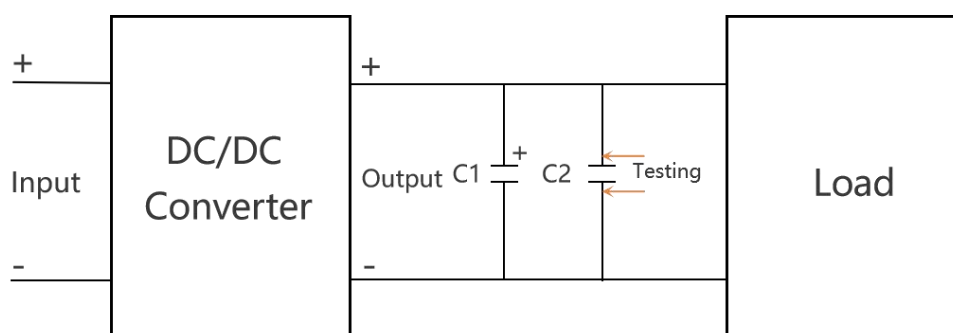
Environment Validation Test

Test	Standard	Condition
Temperature cycling	MIL-STD 883	Cycle 10 times between two chambers set to -55°C and +125°C. The dwell time shall not be less than 10 minutes and the load shall reach the specified temperature within 15 minutes.
HAST (Unbiased)	JEDEC JESD22-A118	96 hours +2/-0 hours, 130°C ± 2°C, 85% ± 5% relative humidity.
High Temperature Storage life	JEDEC JESD22-A103	125°C±10°C ≥ 1000h
Vibration	BS EN 61373 BS EN 60068-2-64	5-150HZ。 Level at each axis - vertical, traverse and longitudinal: 5.72m/s ² rms. 5h in each axis. Crest factor: 3σ. Device is fixed via pins.
Shock	BS EN 61373	The duration of the test was 30 ms, with 3 impacts on each of the 3 mutually perpendicular axes (18 impacts in total). Horizontal: vertical, transverse and longitudinal in each axis: 50 m/s ² . The device was fixed via pins.
Solderability	IPC/ECA J-STD-002D	Modules are baked at 155°C for 4 hours and dipped in flux for 10 seconds after 72 hours. Then dipped for 5 seconds in a solder pot at 255°C ± 5°C (96SC Sn/Ag/Cu)
Solvent cleaning	/	Solvent-Novoc71IPA and TopkleanEL-20A. Pulsed ultrasonic immersion 45°C-65°C
Solvent Resistance	MIL-STD 883	Immerse module and bristle section in isopropyl alcohol for at least 1 minute. Brush the module 3 times and after the third time dry the parts and inspect them.
Solder heat	JEDEC JESD22-B106	Place the test sample in a bath of molten solder at 260±5°C for 10+2/-0 seconds (96SC Sn/Ag/Cu). Dip the leads into the solder bath until they are within 1 mm of the body of the device.
Lead Integrity (Adhesion)	MIL-STD 883	Bend the wire 90° until it breaks.
Lead Integrity(Fatigue)	MIL-STD 883	The wires are bent at a 15° angle. Each wire goes through 3 cycles.

Ripple & Noise Characterization Method

Test	Standard
C1	10uF electrolytic capacitor, Rated voltage at least 1.5 times the output voltage of the module
C2	1uF X7R ceramic capacitor, Rated voltage at least 3 times the output voltage of the module

Ripple & Noise Test Schematic



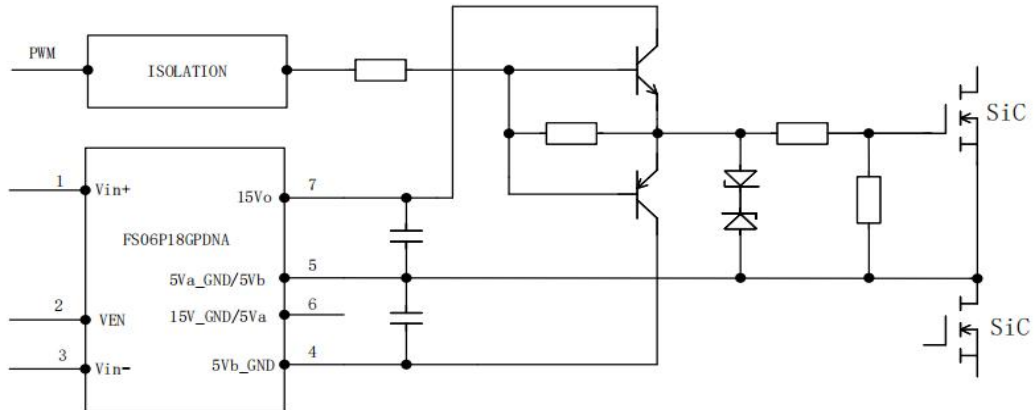
Output Settings

1.DIP

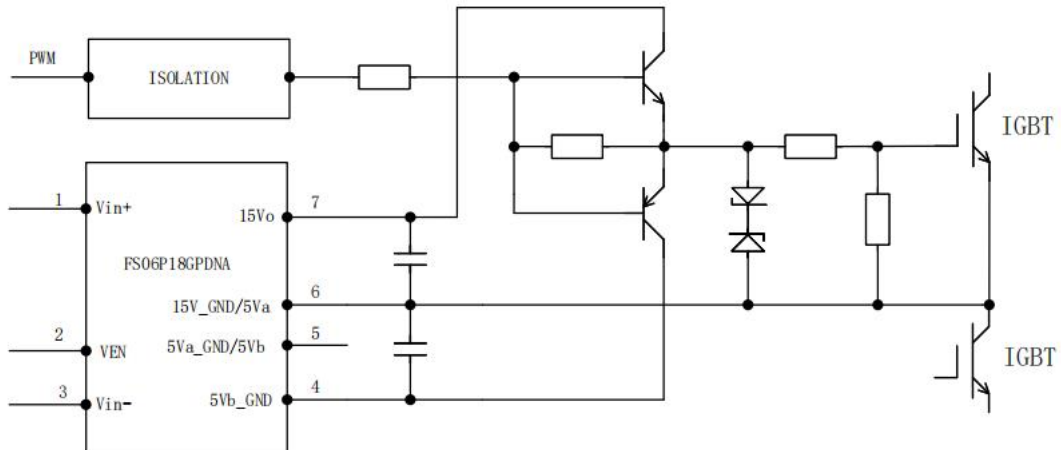
Port	Pin	IGBT	SiC	MOSFET
15Vo	7	+15V 0.24A	+20V 0.24A	+15V 0.3A
15V_GND/5Va	6	0V	NC	0V
5Va_GND/5Vb	5	NC	0V	-5V 0.3A
5Vb_GND	4	-10V 0.24A	-5V 0.24A	NC

Application Schematic

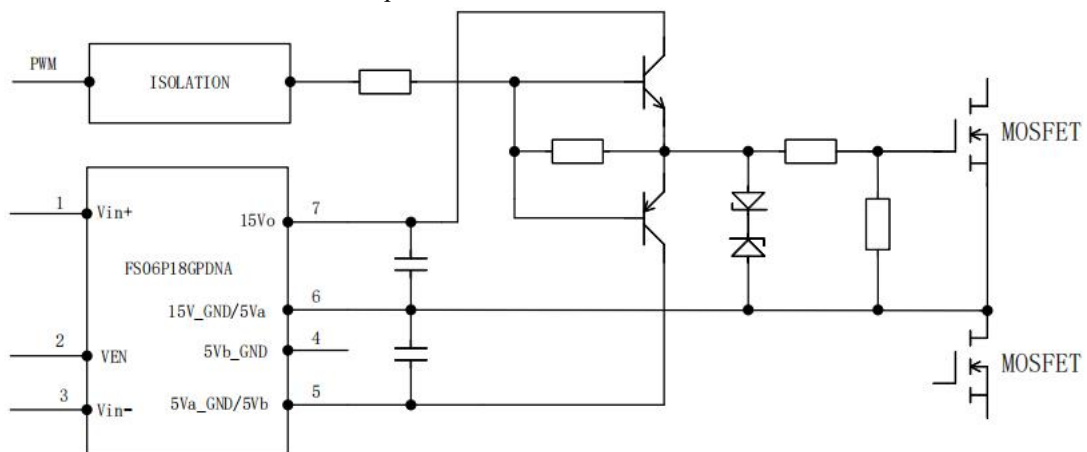
Output for SiC (+20V, -5V)



Output for IGBT (+15V, -10V)



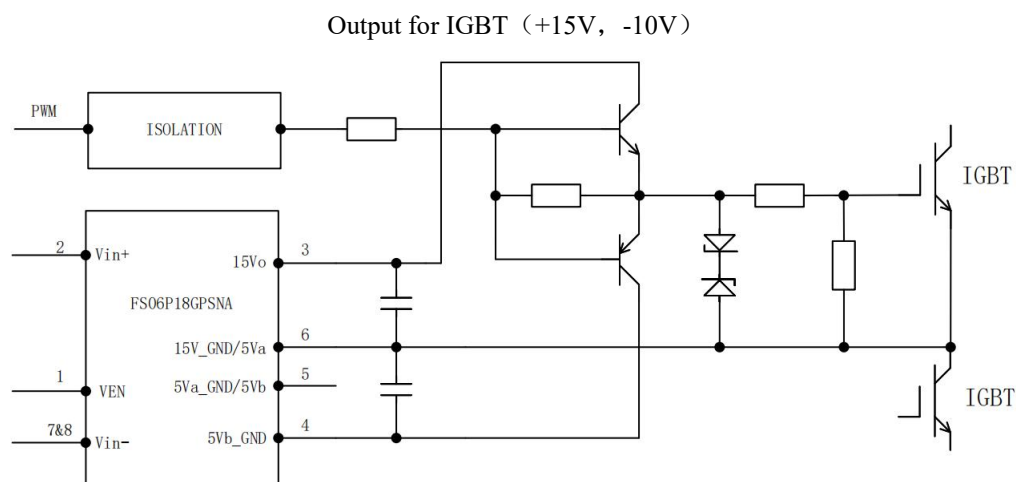
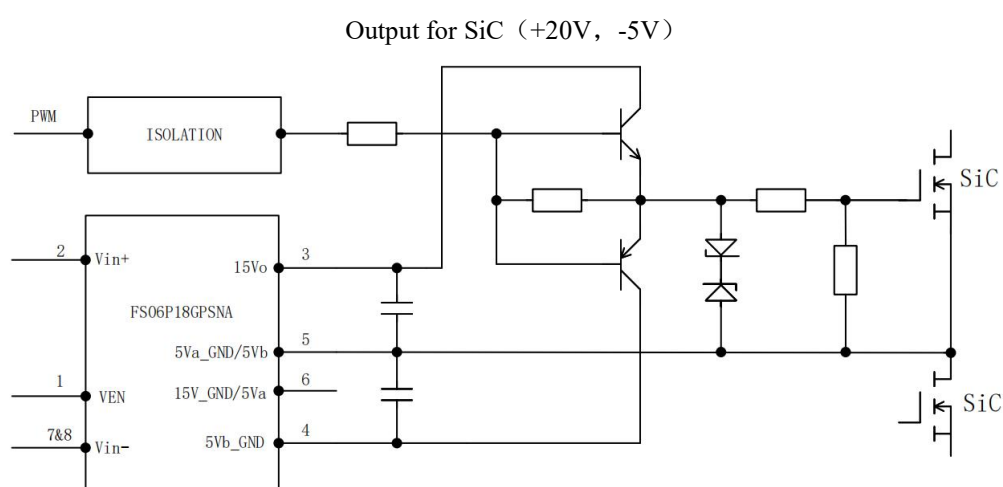
Output for MOSFET (+15V, -5V)



2. SIP

Port	Pin	IGBT	SiC	MOSFET
15Vo	3	+15V 0.24A	+20V 0.24A	+15V 0.3A
15V_GND/5Va	6	0V	NC	0V
5Va_GND/5Vb	5	NC	0V	-5V 0.3A
5Vb_GND	4	-10V 0.24A	-5V 0.24A	NC

Application Schematic

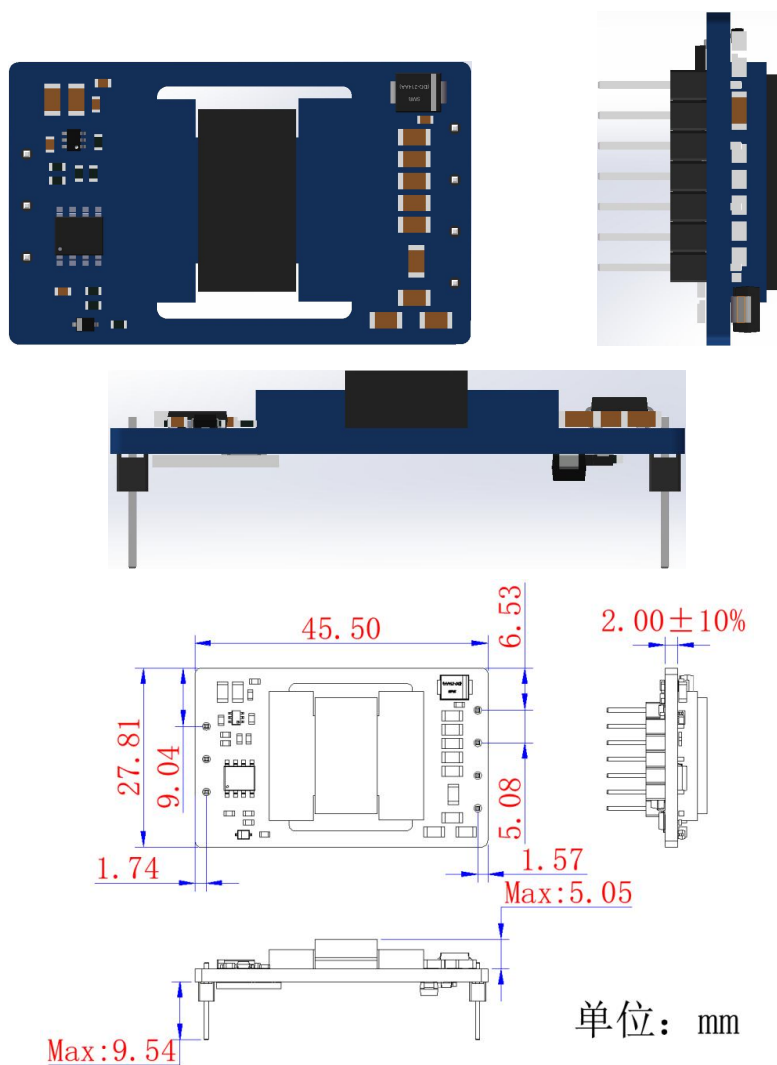


Port	Pin	IGBT	SiC	MOSFET
15Vo	5	+15V 0.24A	+20V 0.24A	+15V 0.3A
15V_GND/5Va	4	0V	NC	0V
5Va_GND/5Vb	3	NC	0V	-5V 0.3A
5Vb_GND	2	-10V 0.24A	-5V 0.24A	NC

[illegible]

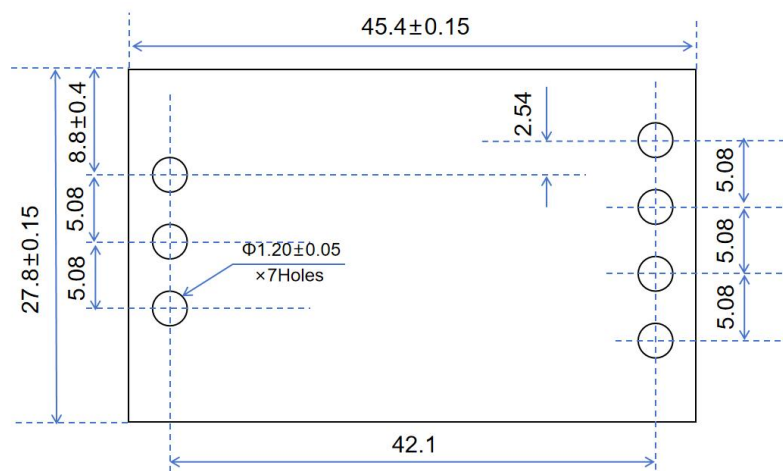
3D and Mechanical Dimensions

1.DIP

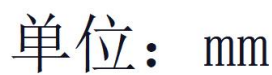


3D、机械尺寸图

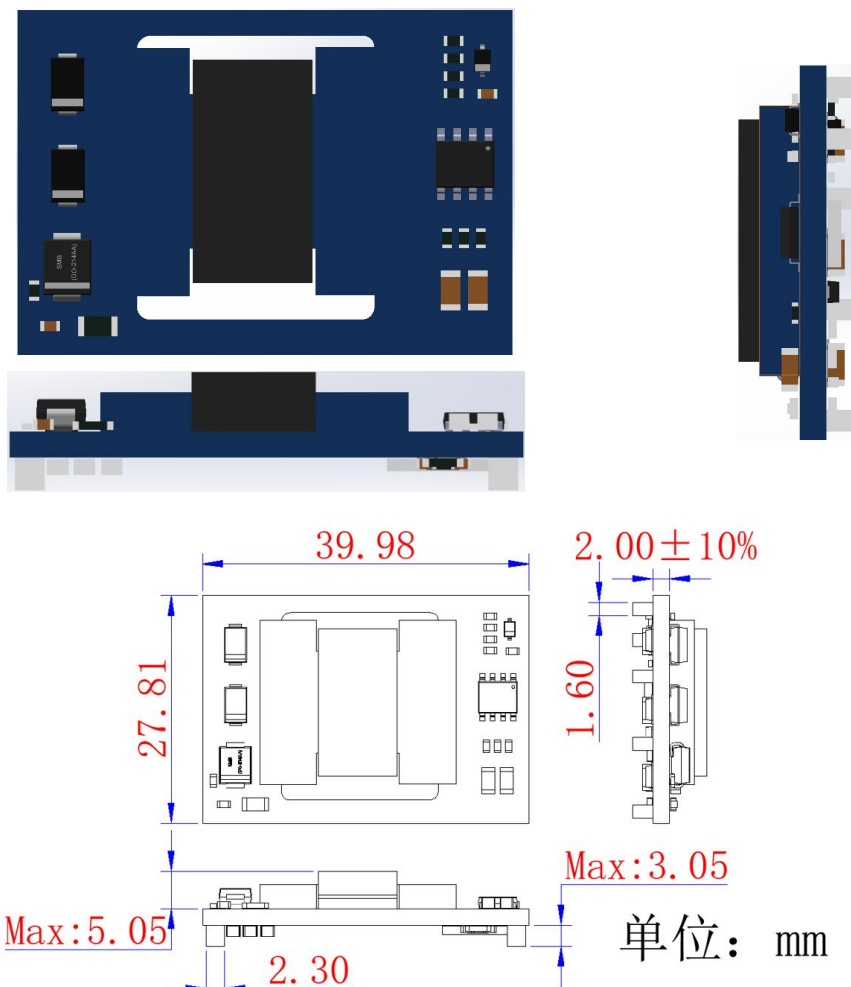
Recommended PCB Layout



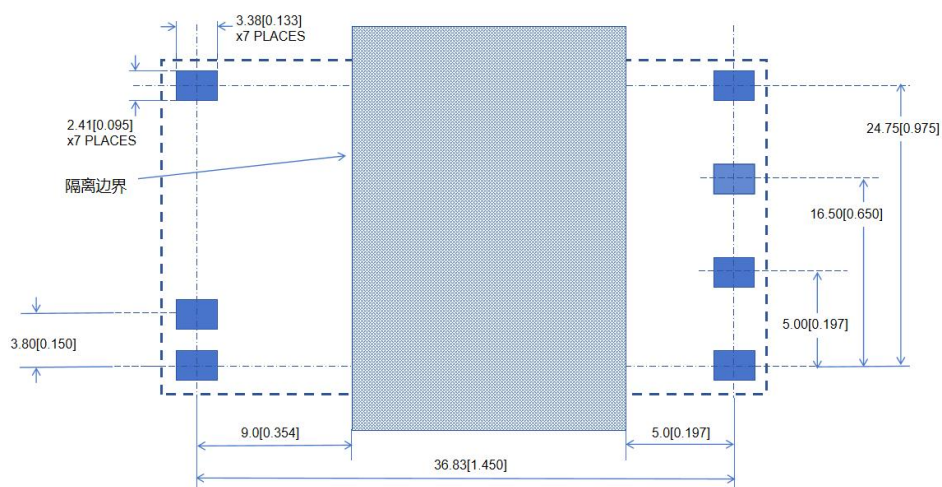
Recommended PCB Layout



3. Surface Mount



Recommended PCB Layout



所有尺寸以毫米(mm)为单位 (括号内为英寸in)。以毫米为准。

Note: 1. The thickness tolerance of the board is $\pm 10\%$;

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

Update Information

Date	Description	Version
2025.06.06	Official Version	V1.0

Ordering Information

The FS06P series are SiC MOSFET, Si-MOSFET, and IGBT compact drive power products that can support a variety of drive voltage configurations. If you have a purchase request, please contact our staff and we will provide the power supply module that best meets your needs.

Part Number	Package Style
FS06P18GPDNA	DIP
FS06P18GPMNA	Surface Mount
FS06P18GPSNA	SIP

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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