

# FS06P18GPSNA

## General Introduction

FS06P18GPSNA is a compact DC/DC isolated drive power module independently developed by Firststack. It provides a safe and reliable drive power supply for the gate drive circuits of SiC, MOSFET and IGBT.

### Highlights :

- Primary - secondary insulation: 10kV DC
- Total output power: 6W
- Wide - range input voltage: 9 - 18V
- Configurable output drive scheme :  
MOSFET: +15V/-5V; IGBT: +15V/-10V; SiC: +20V/-5V
- Input under-voltage protection; Input over-voltage protection;  
Output over-current protection; Output short-circuit protection;  
Over-temperature protection
- Primary-secondary coupling capacitance: 8pF

### Typical Applications :

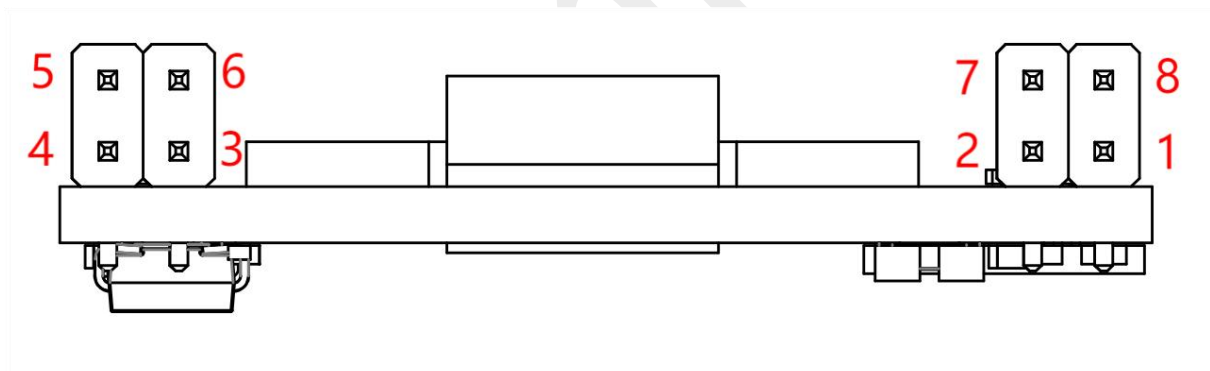
- Energy storage
- Industrial drive
- Photovoltaic system
- Rail Transit



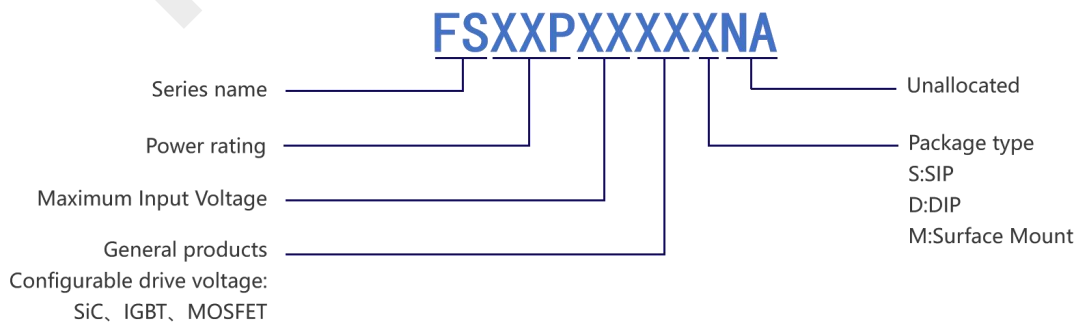
Fig.1 FS06P18GPSNA

## Pin Information

Pin	Definition	Note
1	VEN	It works when floating; enters sleep mode when pulled low
2	Vin+	The nominal input is 12V (9 - 18V)
3	15Vo	15V+
4	5Vb_GND	5Vb-
5	5Va_GND/5Vb	5Va-/5Vb+
6	15Vo_GND/5Va	15V-/5Va+
7	Vin-	Input ground
8	Vin-	Input ground



## Naming Structure



## Technical Parameters

Power model	Input voltage range	Application	Output 1			Output 2				
			Voltage	Current	Power	Voltage	Current	Power		
FS06P18GPSNA	V	Page 9	V	mA	W	V	mA	W		
	9-18	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		
		Performance	load regulation <sup>1</sup> %		Ripple & noise <sup>2</sup> mVp-p		load regulation <sup>1</sup> %		Ripple & noise <sup>2</sup> mVp-p	
			Type	Max	Type	Max	Type	Max	Type	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. Load regulation from 1.50% to 100%;
2. Refer to the ripple test method with a bandwidth limit of 20 MHz.

## Input Characteristics

Parameter	Condition	Min	Type	Max	Units
Input voltage range	Recommended	9	12	18	V
Input ripple current	100% Load		170		mA
	When VEN pin is pulled low		0.5		mA
VEN <sup>1</sup>	Input high level	2		60	V
	Input low level	-1	0	0.5	V

**Note:**

1. VEN is a high impedance TTL input, use the layout with care to avoid the effects of noise.

**Output Characteristics**

Parameter	Condition	Min	Type	Max	Units
Minimum load	when the module is unloaded 15.2V/6.0V/6.0V	1			%
Voltage accuracy	Output 1		1		%
	Output 2		4		%
Line regulation	9V <sub>in</sub> →18V <sub>in</sub> , 50% Load			2	%
Total regulation	1% Load→100% Load			5	%
Transient response	Peak deviation for 50%-100% load swing		3		%
	Settling time		0.3		ms

**General Characteristics**

Parameter	Condition	Min	Type	Max	Units
Switching frequency	100% Load			360	kHz
Start-up times	Output voltage delay		3.5		ms

**Isolation Characteristics**

Parameter	Condition	Min	Type	Max	Units
Isolation test voltage	Continuous test for 1 minute, leakage current <1mA	10000			VDC
	50HZ, 1 minute	5000			V <sub>rms</sub>
Resistance	1kVDC	100			GΩ
Safety standard	Creepage and clearance 8mm				

### Protective Characteristics

Parameter	Condition	Min	Type	Max	Units
Input under-voltage	Protection thresholds		7.5		V
Input over-voltage	Protection thresholds		21.5		V
Over-current protection	Full Voltage 25V		0.3		A
Over-temperature protection	Protection thresholds		160		°C

### Temperature Characteristics

Parameter	Condition	Min	Type	Max	Units
Operation	Reference to the derating curve	-40		105	°C
Storage		-50		125	°C
Product temperature	12Vin, 6W full load, 25°C, no wind		40		°C

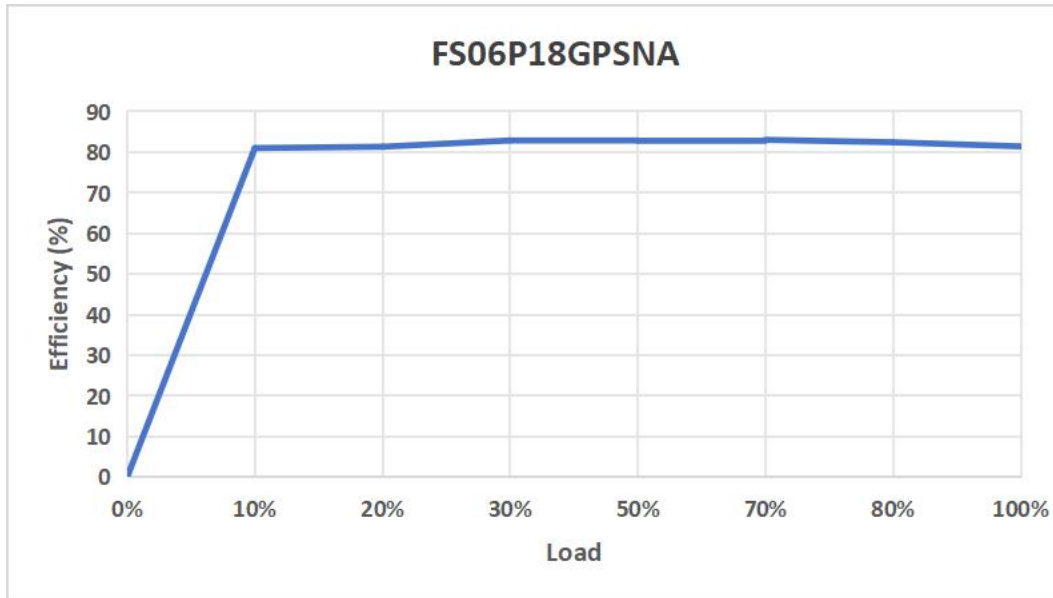
### Absolute maximum rating

Parameter	Condition	Min	Type	Max	Units
output capacitance	20V			220	μF
	15V			330	
	-10V			330	
	-5V			490	
Input voltage	21.5V-35V over-voltage protection	-0.3		35	V
Wave Solder	Wave Solder profile not to exceed the profile recommended in IEC 61760-1				

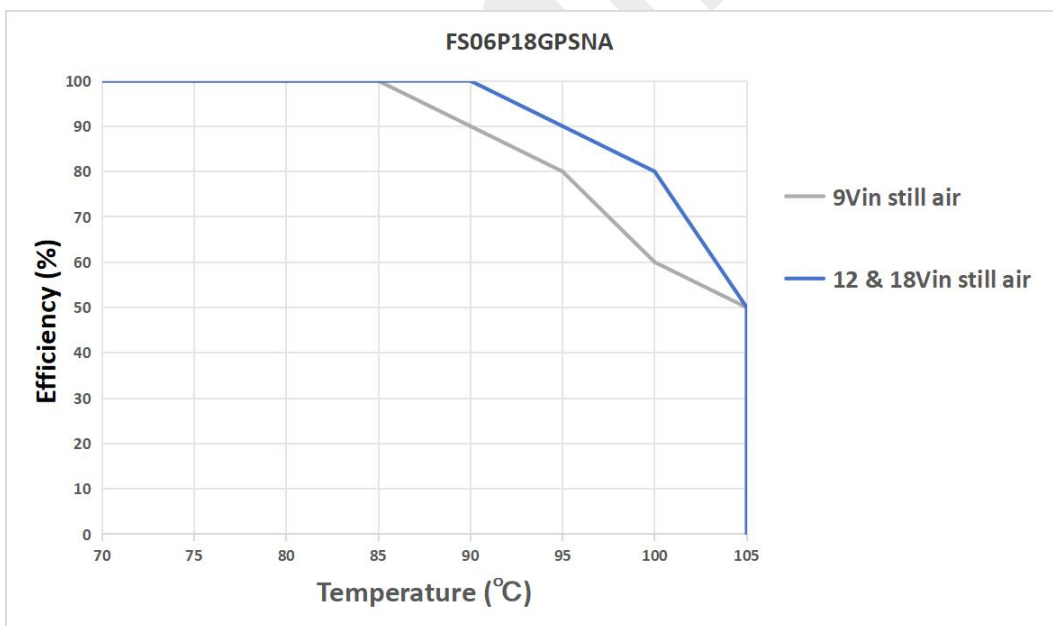
#### Note:

Unless otherwise specified, the above characteristics are based on 12V input and 25°C ring temperature.

### Efficiency vs. Load



### Derating Curve



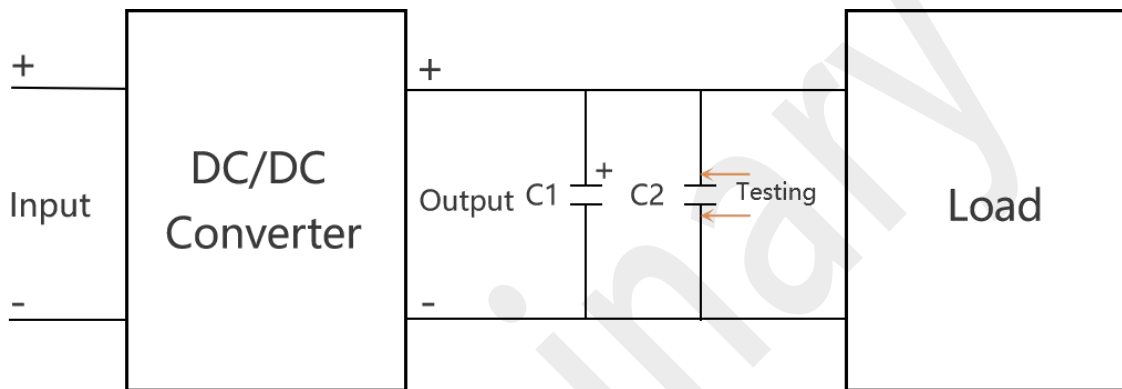
**Environmental Validation Testing**

<b>Test</b>	<b>Standard</b>	<b>Condition</b>
Temperature cycling	MIL-STD 883	10 cycles between two chambers set to achieve -55°C and +125°C. The dwell time shall not be less than 10min and the load shall reach the specified temperature in 15min.
HAST(Unbiased)	JEDEC JESD22-A118	96Hrs +2/-0Hrs at 130°C ± 2°C, 85% ± 5% R.H.
Vibration	BS EN 61373 BS EN 60068-2-64	5–150Hz. Level at each axis–Vertical, Traverse and Longitudinal: 5.72m/s <sup>2</sup> rms. 5 hours in each axis. Crest factor: 3 Sigma. Device is secured via pins.
Shock	BS EN 61373	Test is 30ms duration, 3 shocks in each sense of 3 mutually perpendicular axis (18 shocks total). Level at each axis: Vertical, Traverse and Longitudinal: 50m/s <sup>2</sup> . Device is secured via pins.
Solvent Resistance	MIL-STD 883	The parts and the bristle portion of the brush are immersed in Isopropanol for a minimum of 1 minute. The parts are brushed 3 times, after the third time the parts are blown dry and inspected.
Solder heat	JEDEC JESD22-B106	The test sample is subjected to a molten solder bath at 260 ±5°C for 10 +2/-0 seconds (96SC tin/silver/copper). The leads are dipped in the solder bath to within 1mm of the device body.
Lead Integrity (Adhesion)	MIL-STD 883	Leads are bent through 90° until a fracture occurs.
Lead Integrity (Fatigue)	MIL-STD 883	The leads are bent to an angle of 15°. Each lead is subjected to 3 cycles.
Solder ability	IPC/ECA J-STD-002D	Parts are baked for 4 hours at a temperature of 155°C within 72 hours they are dipped in flux for 10 seconds. Followed by dipping in a solder pot at 255°C ± 5°C for 5 seconds (96SC tin/silver/copper)
High Temperature Storage life	JEDEC JESD22-A103	125°C +10/-0°C for ≥1000 hours
Solvent cleaning	/	Solvent–Novec 71IPA & Topklean EL-20A. Pulsed ultrasonic immersion 45°C- 65°C

## Ripple &amp; Noise Characterisation Method

Test	Standard
C1	10 $\mu$ F electrolytic capacitor rated at least 1.5 times the output voltage of the module.
C2	1 $\mu$ F X7R ceramic capacitor rated at least 3 times the module output voltage.

## Differential Mode Noise Test Schematic

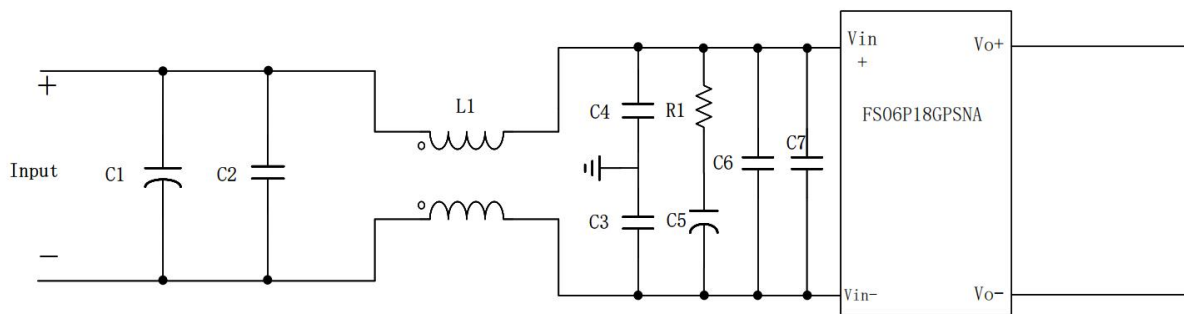




**Output Configurations for Power Switches**

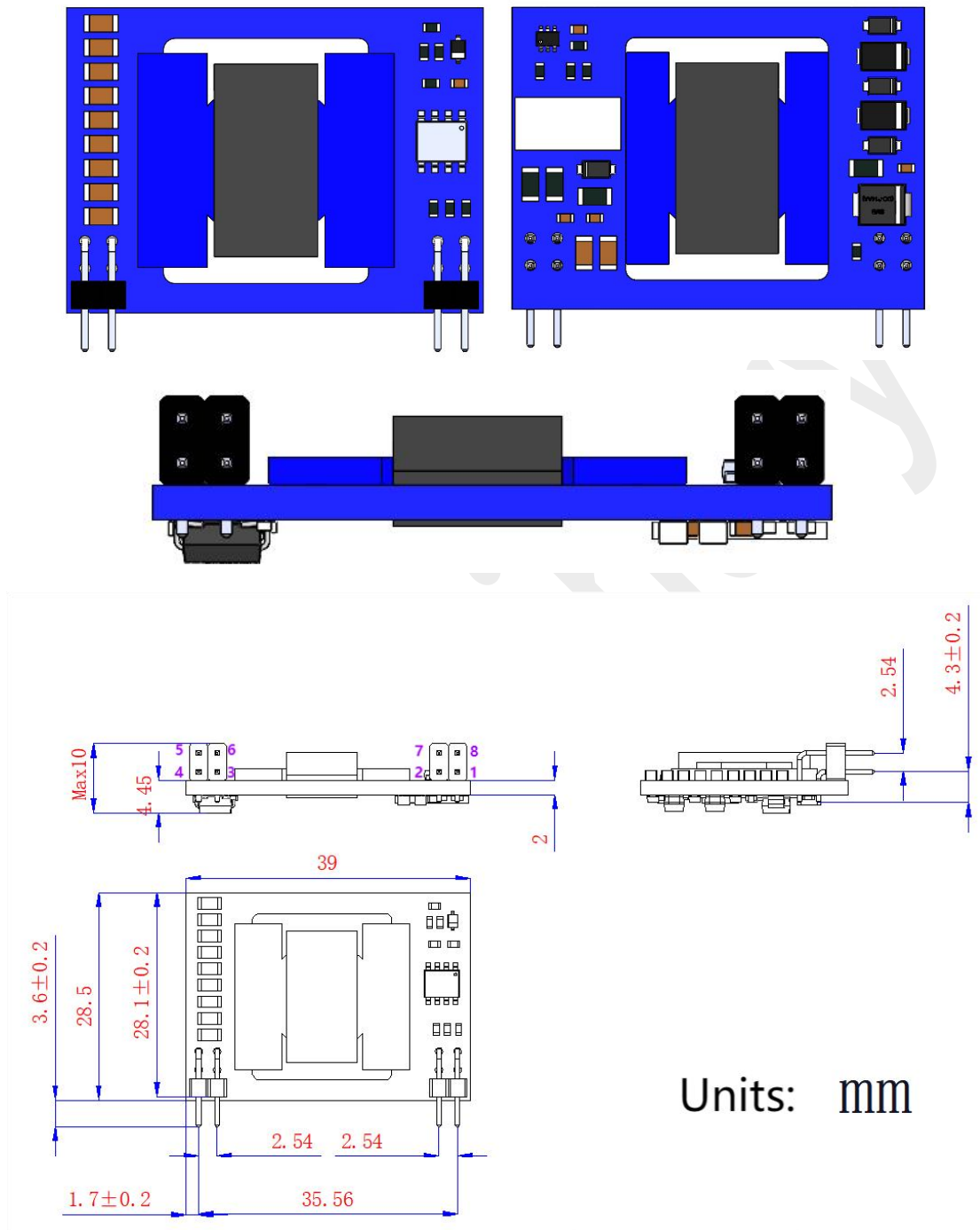
Ports	Pin	IGBT	SiC	MOSFET
15Vo	3	+15V 0.24A	+20V 0.24A	+15V 0.3A
15V_GND/5Va	6	0V	Floating	0V
5Va_GND/5Vb	5	Floating	0V	-5V 0.3A
5Vb_GND	4	-10V 0.24A	-5V 0.24A	Floating



**EMC Filtering and Spectra (To be determined)****Note:**

EN50155, UL 62368-1 relevant characteristics are being tested.

The above diagram shows the EMC test application schematic diagram for reference only.

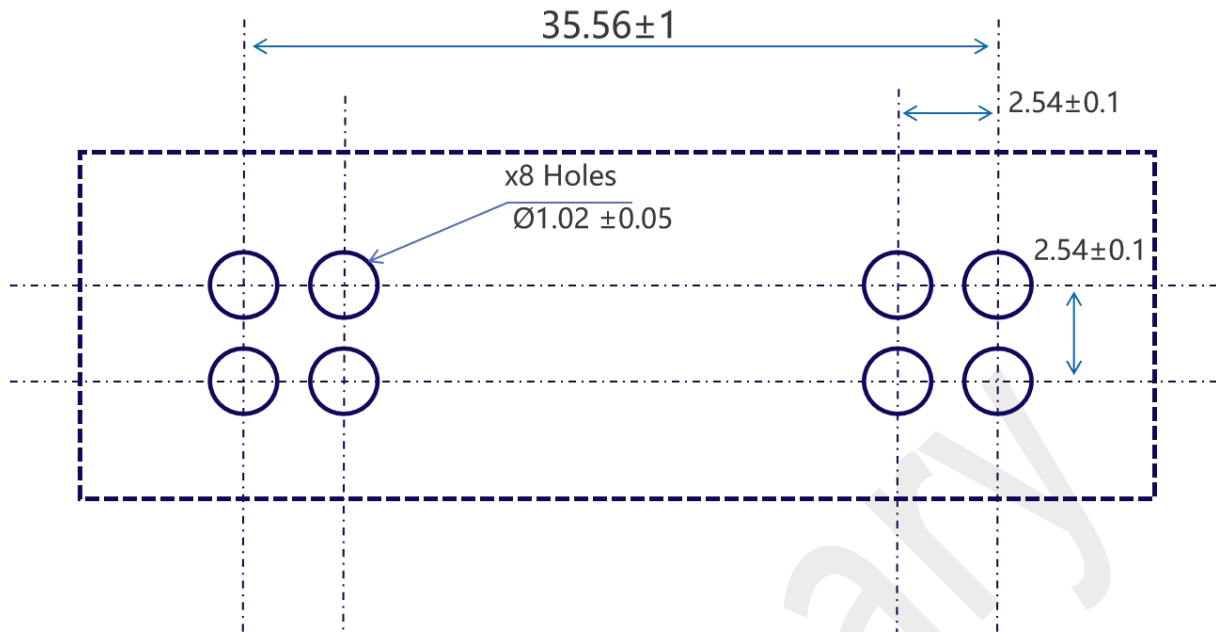
**3D and Mechanical Dimension**


3D and mechanical dimension

**Note:**

1. Tolerance of plate thickness  $\pm 10\%$ ;
2. The rest of the dimensional tolerances refer to GB/T1804-m.

Recommended PCB Layout



PCB Layout

## Ordering Information

The FS06P18GPSNA is a SiC, MOSFET and IGBT compact drive power supply product that can support multiple drive voltage configurations. Please contact our staff for the power supply module that best meets your needs.

## 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.

## 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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