PA01F39 FEM Module

- Wide Frequency Range: 150–190 MHz,300–350 MHz, 400–470 MHz bands
- 8 V Power Supply
  @150 MHz, input 25 dBm, output 38–39 dBm
  @315 MHz, input 26 dBm, output 38–39 dBm
  @433 MHz, input 30 dBm, output 38–39 dBm
- Comes with a low-noise amplification circuit, achieving a gain of over 10dB
- Compact size, easy for customer secondary development

Product Specification



PA01F39-IPEX



PA01F39-SMA

Catalogue

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Note: Revision History

Revision	Date	Comment
V1.0	2024-11	First release
V2.1	2025-10	Added frequency bands and parameters

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1. Description

PA01F39 module is a high-performance FEM operating across multiple frequency bands, including 150–190 MHz, 300–350 MHz, and 400–470 MHz, integrating multiple RF functions. It features a built-in power amplifier (PA) supporting up to 500 mW input power and delivering up to 8 W output power. The module also includes a low-noise amplifier (LNA), which has been verified to improve receiver sensitivity by approximately 5dB in LoRa mode and 6 dB in FSK mode.

With its stamp-hole package design, the PA01F39 is compact and easy to integrate into embedded systems, significantly reducing the complexity of high-power wireless module development, simplifying design, and improving development efficiency.

2. Features

- Ultra-wide frequency range: 150–190 MHz, 300–350 MHz, 400–470 MHz
- Wide voltage range: 4-8.5V
- Built-in transmit/receive switch, allowing both reception and transmission with a single antenna
- Built-in low-noise amplification, with a noise figure (NF) of 1.0 dB

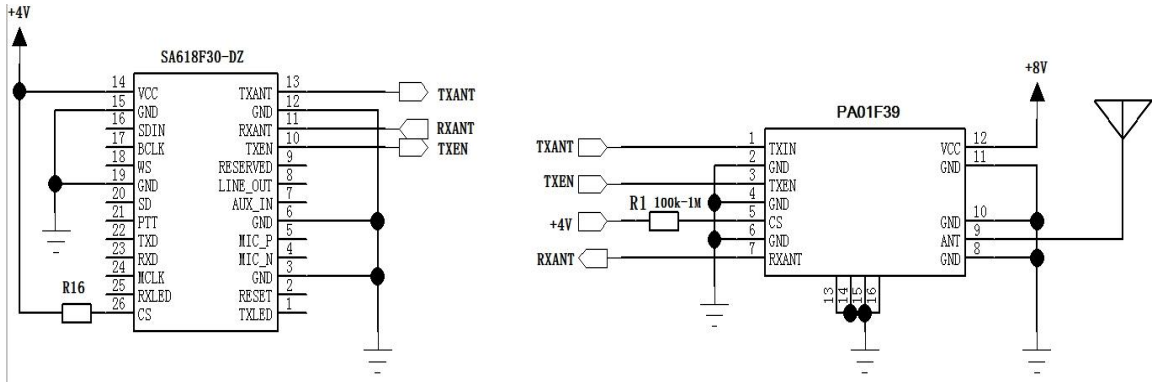
3. Applications

- High-power amplification for wireless data transmission
- High-power amplification for wireless voice transmission

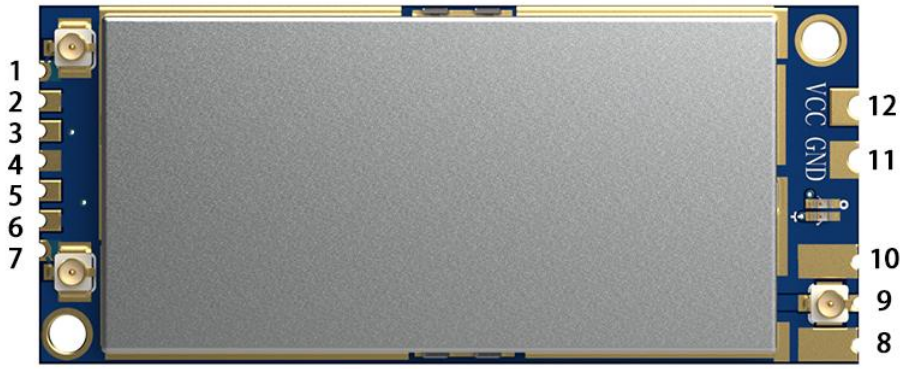
4. Electrical Characteristics

Parameters	Test Conditions	Min.	Typ.	Max.	Unit
Voltage Range		4	7.4	8.5	V
Operating Temperature		-40	25	70	℃
Max. TX Input Power			32		dBm
Max. RX Input Power			0		dBm
Current Consumption					
Standby Current			< 30		uA
Receive Current			< 4		mA
	@440MHz,39dBm,8V,0.5Dduty Cycle		1.3		A
	@150MHz,39dBm,8v,		1.5		A
RF Parameters					
Operating Frequency Range		400		470	MHz
		150		190	MHz
		300		350	MHz
Output Power	@440MHz, TXANTIN 30dBm,Vcc=8V	38	39	40	dBm
LNA Gain	@400-470MHz,Input -50dBm	6		10	dB
Receiver Noise Figure			1.0		dB

5. Typical Application



6. Pin definition



Pin NO	Pin name	I/O	Description
1	TXANTIN	-	The amplifier signal input pin should not exceed a maximum input signal of 32dBm
2,4,6,8,10,11	GND	-	Connect to power ground
3	TXEN	0-3.3V	Transmit enable control pin,High level for transmission, low level for reception. (Note: This pin also controls the gate voltage of the internal power amplifier. The high level should not exceed 3.3V, as higher voltage may damage the internal power amplifier IC.)
5	CS	0-5v	Sleep pin,This pin should be pulled high during operation and pulled low during sleep. There is no internal pull-up.
7	RXANTOUT	-	Receiver signal output pin， Connect to the external matching circuit of the user's product. If the user only intends to use it for power amplification, this pin can remain unconnected.
9	ANTOUT	-	Power amplifier output pin and receiver signal input pin
12	VCC	0-8.5V	Module power supply positive input

7. Input & Output Power Reference Table.

Note: Signal source is SA618F30-DZ, operating voltage: 7.6 V

Frequency (MHz)	PA Input Power (dBm)	PA Output Power (dBm)	Average Operating Current (A)
400	17.0	25.8	0.53
	19.7	31.6	0.76
	22.6	36.7	1.11
	25.2	38.5	1.34
	27.6	39.1	1.53
	30.3	39.9	1.77
420	18.2	31.2	0.73
	21.2	36.4	1.05
	23.9	38.1	1.25
	26.4	39.0	1.39
	28.5	39.6	1.48
	30.7	40.0	1.75
440	18.1	34.9	0.85
	20.8	36.9	1.05
	23.6	39.2	1.27
	26.2	39.6	1.32
	28.4	39.9	1.35
	30.1	39.9	1.39
460	18.5	32.5	0.71
	22	36.8	0.98
	24	38.2	1.13
	26.2	38.8	1.22
	29	39.1	1.22
	31.1	39.2	1.30
470	18.9	29.4	0.59
	21.8	32.65	0.73
	24.7	35.0	0.88
	27.6	37.0	1.06
	30.1	38.1	1.16
	31.5	38.5	1.26

Note: The above current is measured with the module transmitting for 1 s and receiving for 0.5 s. For single-carrier continuous transmission, the operating current will be roughly doubled.

Note: Signal source is LoRa1262F30-150, operating voltage: 8.0 V

Frequency (MHz)	PA Input Power (dBm)	PA Output Power (dBm)	Average Operating Current (A)
150	13	27.7	0.269
	15.3	31.3	0.465
	17.9	34.6	0.753
	21.2	36.89	1.1
	24.6	37.5	1.12
	27.5	37.7	1.16
	29.6	37.7	1.17
160	12.6	26.2	0.269
	15.0	30.5	0.423
	17.5	34.16	0.754
	20.6	37.2	1.18
	24.0	38.6	1.43
	27.0	39.1	1.54
	29.7	39.3	1.59
170	14.0	31.3	0.542
	16.3	34.3	0.785
	19.1	37.3	1.34
	22.5	38.0	1.47
	25.9	38.4	1.55
	28.9	38.5	1.57
	30.9	38.5	1.58
180	17.2	37.6	1.21
	20.0	38.2	1.28
	23.0	38.4	1.35
	26.0	38.6	1.39
	28.0	38.7	1.4
	29.8	38.7	1.42
190	16.3	33.0	0.557
	19.4	35.2	0.739
	22.0	36.7	0.911
	24.3	37.7	1.07
	25.9	38.2	1.16
	27.6	38.3	1.2
	28.9	38.5	1.23

Note: Data show that the input signal amplitude should not exceed 27dBm for optimal efficiency.

Note: Signal source is LoRa1262F30-315, operating voltage: 8.0 V.

Frequency (MHz)	PA Input Power (dBm)	PA Output Power (dBm)	Average Operating Current (A)
300	18	29.3	0.497
	20.5	37.1	1.37
	23.5	38.0	1.59
	26.5	38.2	1.63
	29.6	38.4	1.65
310	15.6	35.1	1.02
	16.5	37.7	1.45
	21.4	38.3	1.64
	24.5	38.6	1.8
	27.8	38.7	1.76
320	17	29.4	0.514
	19.8	36.4	1.2
	22.8	38.5	1.65
	26.2	38.9	1.8
	29.4	39.1	1.88
330	21.9	29.5	0.513
	25.3	38.3	1.67
	28.5	38.8	1.86
	30.7	39.0	1.93
340	25.0	36.1	1.19
	28.7	37.3	1.51
	30.5	37.8	1.63
	31.4	38.1	1.7
350	22.3	32.0	0.72
	27.3	33.8	0.92
	29.1	35.0	1.11
	31.2	36.2	1.33
	31.6	36.9	1.48

Note: Data indicate:

300-330 MHz: input signal ≤ 27 dBm for best efficiency，

340-350 MHz: input signal can reach 30 dBm

Note: The above current refers to the module operating with 1 second of transmission and 0.5 seconds of reception. If operating with single-carrier transmission, the operating current will double

8. Voltage Voltage & Power Reference Table

Operating voltage (V)	430MHz		160MHz		330MHz	
	Output power (dBm)	Operating current (A	Output power (dBm)	Operating current (A)	Output power (dBm)	Operating current (A)
8.0	39.5	1.40	38.9	1.50	38.8	1.86
7.5	38.9	1.36	38.4	1.42	38.2	1.76
7.0	38.3	1.30	37.9	1.34	37.7	1.67
6.5	37.9	1.24	37.3	1.26	37.1	1.57
6.0	37.2	1.16	36.7	1.18	36.5	1.48
5.5	36.5	1.07	35.9	1.09	35.8	1.38
5.0	35.2	0.92	35.1	1.0	35.1	1.28
4.5	34.4	0.77	34.2	0.913	34.3	1.17
4.0	32.1	0.59	33.2	0.817	33.4	1.06

9. Heat Dissipation Considerations

This is a high-power module. It generates significant heat during operation. For long-term use, proper heat dissipation is required. Heat-sinks are included with shipment; users may choose to install them or implement alternative thermal solutions according to their device design.



Heat-sink Temperature Rise Data

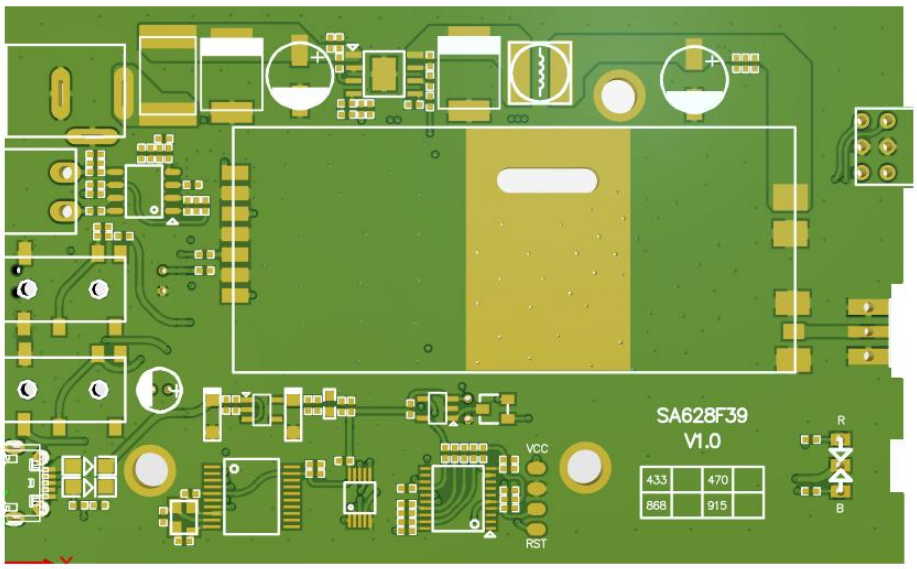
Test Temperature：28℃ Power：9W Frequency：440MHz

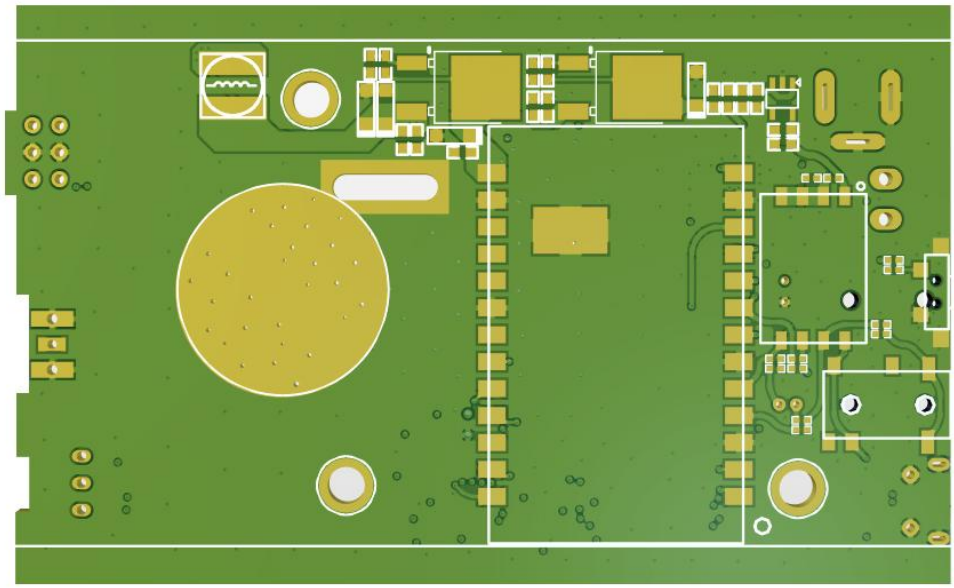
Operating Mode	Heat-sink Temperature (℃)	Operating Time (min)
Continuous Single-Carrier TX	From 28 → 55	3
50% Duty Cycle TX	From 28 → 55	5

Note: If no additional heat-sink is used, continuous operation of the module is recommended not to exceed 3 minutes.

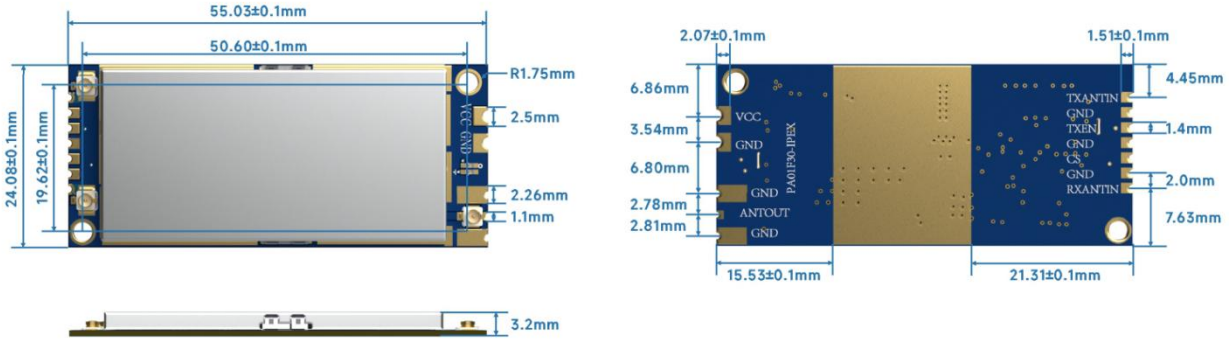
The figure below shows our reference design. The module PCB package features slotted pads, with solder applied from the back side of the PCB to better transfer heat to another PCB. The heat is then conducted to the enclosure via a copper slug.

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10. Mechanical Dimensions (Unit:mm)



11. Product order information

Part No.	Description
PA01F39-U-IPEX	Frequency: 400-480MHz,ANTOUT via IPEX connector
PA01F39-U-SMA	Frequency: 400-480MHz, ANTOUT via SMA connector
PA01F39-V-IPEX	Frequency: 150-190MHz, ANTOUT via IPEX connector
PA01F39-V-SMA	Frequency: 150-190MHz, ANTOUT via SMA connector

Appendix :SMD Reflow Chart

Below reflow profile is recommended for SMT technology:

