SXA021

14-Bit, 50 MSPS A/D Converter

14 位 50MSPS A/D 转换器

14-bit | 1 channel | 50 MSPS | QFN32 | Parallel CMOS

14位 | 单通道 | 50MSPS | QFN32 | 并行CMOS

对标 / Cross Reference: AD9245 — pin-to-pin compatible alternative

Product Datasheet / 产品数据手册

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SXA021 型 14 位 50MSPS A/D 转换器产品说明书、使用手册

SXA021 14-Bit 50MSPS A/D Converter — Product Datasheet / User Manual

深信科技 / Shenzhen Shenxin Technology Co., Ltd. 版本 / Revision: V1.20260724 对标型号 / Cross Reference: AD9245 — pin-to-pin compatible alternative

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版本修订记录 / Revision History

版本号 / Version	发布日期 / Release Date	更改章节 / Changed Section	更改说明 / Description	备注 / Note
V1.20260724	20260724	——	首次发布 / Initial release	

产品用途及应用范围 / Applications

SXA021 is suitable for the following applications: SXA021 适用于以下应用：

- 高端医疗成像设备 / High-end medical imaging equipment
- 通信接收器中频信号采样 / IF signal sampling in communication receivers
- 便携式仪表 / Portable instruments
- 低功耗数字示波器 / Low-power digital oscilloscopes

标准 / Standards

- 详细规范及确认号：Q/GC 0224-2026《半导体集成电路 SXA021 型 14 位 50MSPS A/D 转换器详细规范》
- Detailed specification and approval No.: Q/GC 0224-2026, "Detailed Specification for Semiconductor Integrated Circuit SXA021 14-Bit 50MSPS A/D Converter"
- 质量等级：企标 / Quality grade: Enterprise standard

产品特点 / Features

- 模拟电源电压：3.0V～3.3V / Analog supply voltage: 3.0V to 3.3V
- 数字电源电压：2.5V～3.3V / Digital supply voltage: 2.5V to 3.3V
- 最大采样率：50MSPS / Maximum sampling rate: 50MSPS
- 信噪比：≥65dB / Signal-to-noise ratio: ≥65dB
- 微分误差：-0.9LSB~0.9LSB / Differential error: -0.9LSB to 0.9LSB
- 线性误差：-7.5LSB~7.5LSB / Linearity error: -7.5LSB to 7.5LSB
- 功耗：≤414mW / Power consumption: ≤414mW
- 模拟输入范围：1VPP～2VPP / Analog input range: 1VPP to 2VPP
- 电路接口：并行 CMOS 电平接口 / Interface: parallel CMOS-level interface
- ESD 等级：1C 级，HBM 模型：1000V / ESD rating: Class 1C, HBM model: 1000V

产品描述 / Product Description

SXA021 型 14 位 50MSPS A/D 转换器是采用 CMOS 工艺制造的单片集成电路。该产品采用流水线（Pipeline）结构，电路内部包含采样/保持放大器、流水线结构 ADC、基准电压、时钟稳定电路和模式选择等电路。

The SXA021 14-bit 50MSPS A/D converter is a monolithic integrated circuit fabricated in CMOS technology. The device uses a pipeline architecture and integrates a sample-and-hold amplifier, pipelined ADC, reference voltage, clock stabilization circuit, mode selection and other circuits.

该电路采用 32 引线塑料片式载体封装（QFN32），外形尺寸为长 5.0mm×宽 5.0mm×高 0.75mm。

The device is housed in a 32-lead plastic chip carrier package (QFN32) measuring 5.0mm × 5.0mm × 0.75mm.

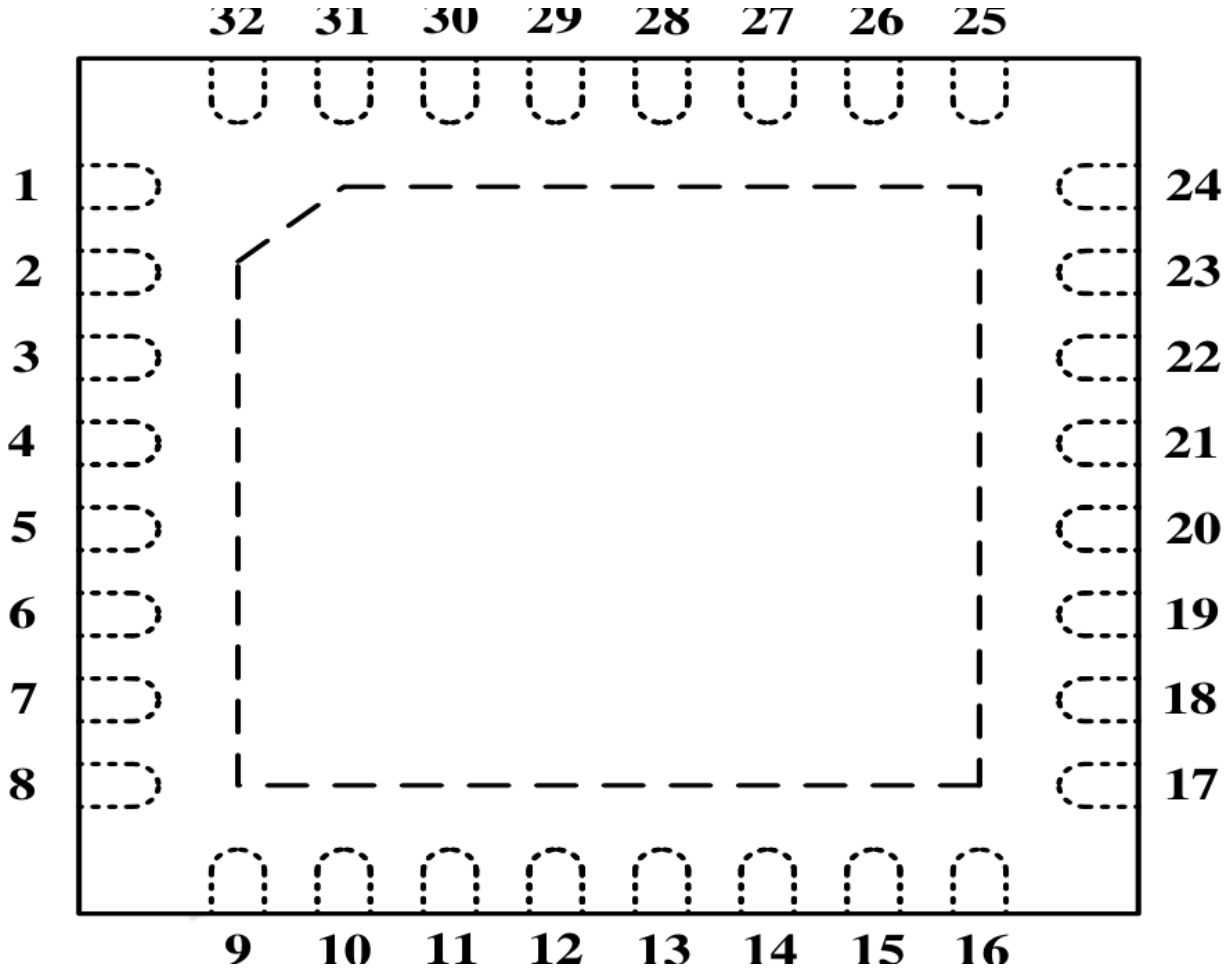


Figure 1: SXA021 功能框图 / Functional block diagram

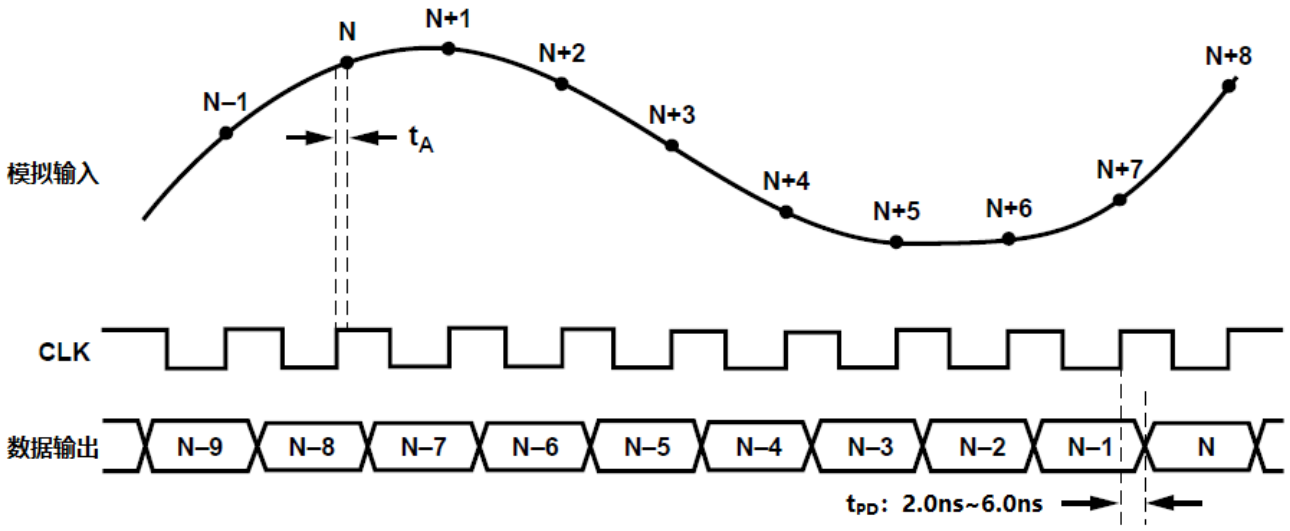


Figure 2: SXA021 工作时序图 / Operating timing diagram

产品外形图 / Package Outline Drawing

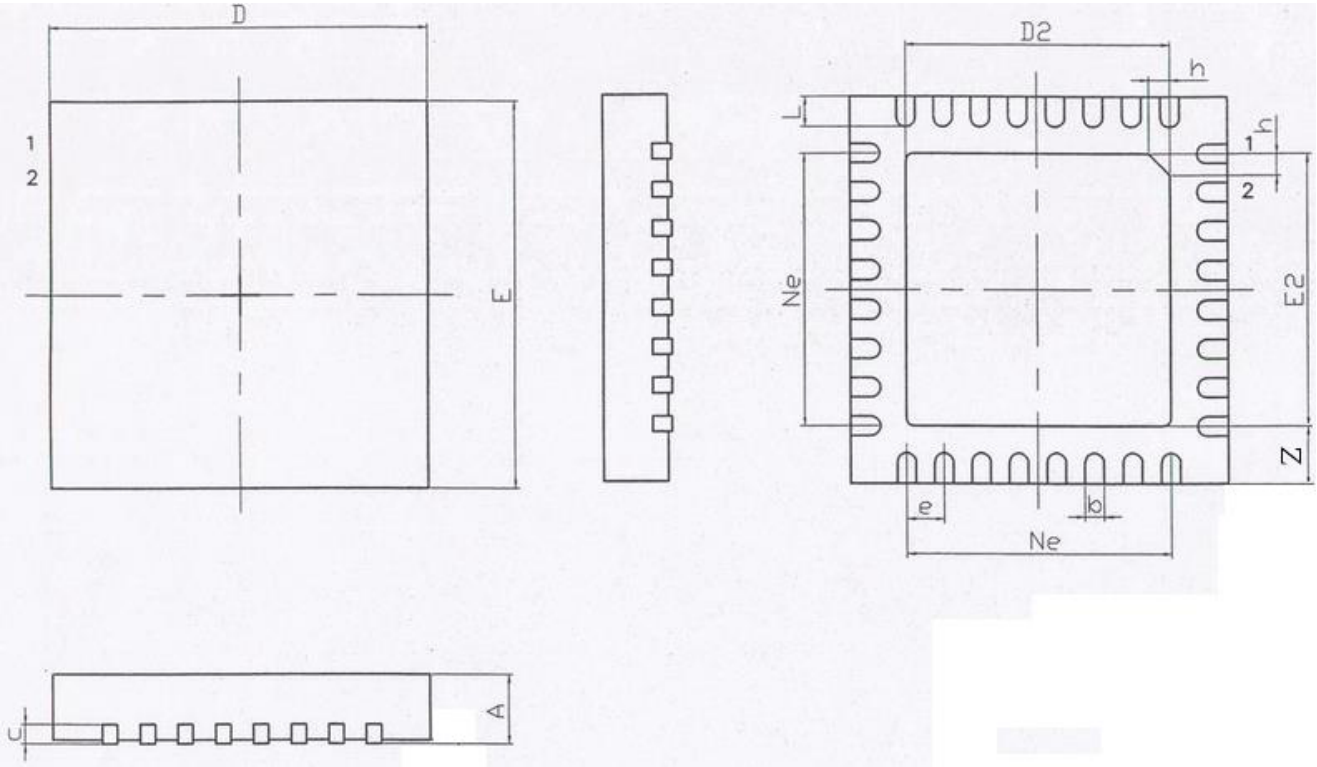


Figure 3: 产品外形尺寸图 / Package outline dimensions

单位为毫米 / Units: mm

尺寸符号 / Symbol	最小 / Min	公称 / Nom	最大 / Max	尺寸符号 / Symbol	最小 / Min	公称 / Nom	最大 / Max
A	0.70	0.75 a	0.80	e	—	0.50	—
D	4.80	5.00 a	5.20	D1	3.40	3.50 a	3.60
E	4.80	5.00 a	5.20	E1	3.40	3.50 a	3.60
b	0.20	0.25 a	0.30	L	0.30	0.40 a	0.50

注 a：外壳实际公称值，推荐用户参考该尺寸设计使用。 Note a: Actual nominal package values; users are recommended to reference these dimensions for design.

引出端排列（俯视图）/ Pinout (Top View)

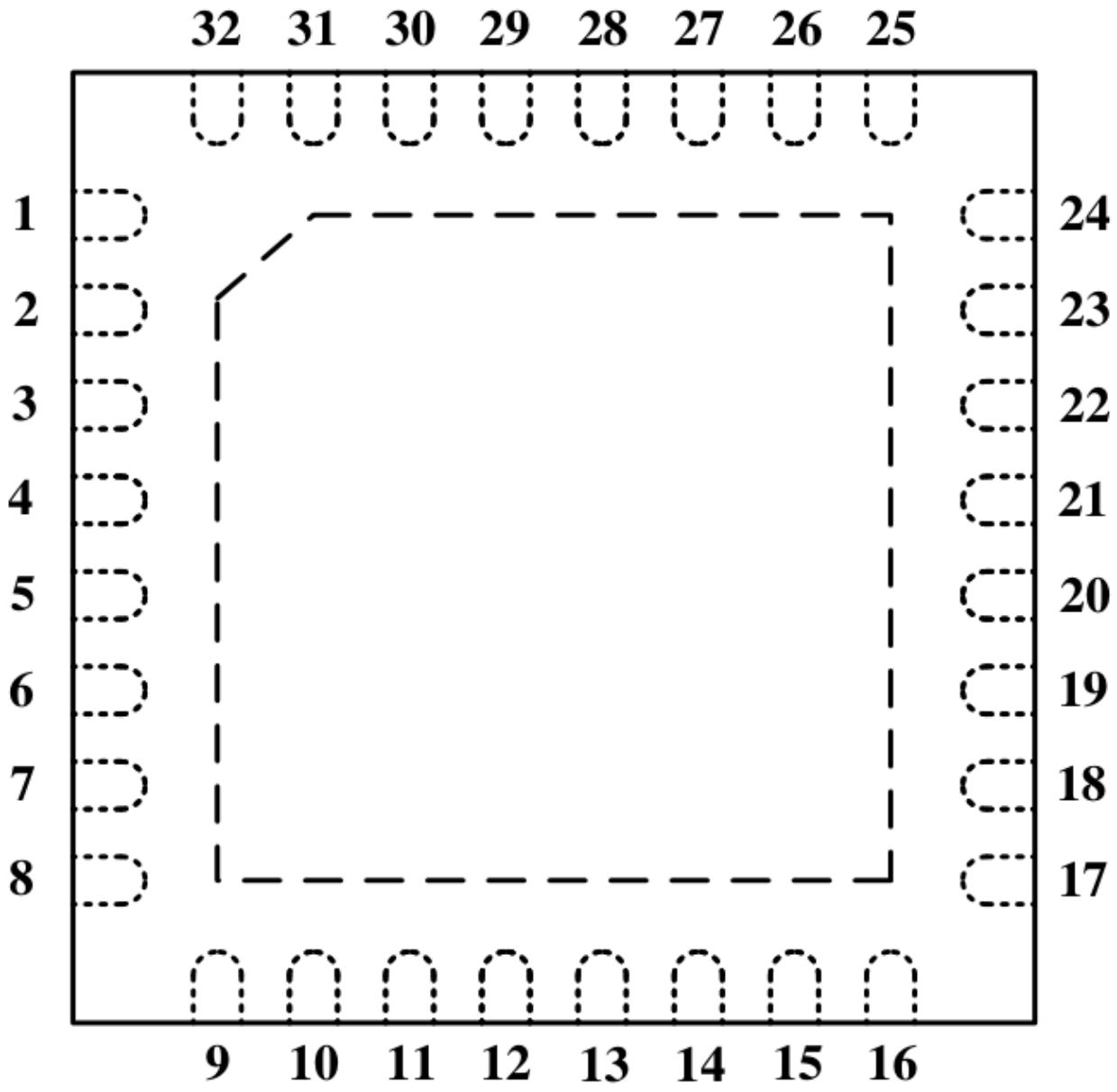


Figure 4: 引出端排列图 / Pinout diagram

引出端功能符号表 / Pin Function Table

引出端号 / Pin No.	符号 / Symbol	名称 / Name	I/O
1	NC	空 / No connect	/
2	INCLK	时钟输入 / Clock input	I
3	NC	空 / No connect	/
4	PDWN	省电功能选择 / Power-down mode select	I
5	D0	数据输出位 D0（LSB) / Data output bit D0 (LSB)	O

引出端号 / Pin No.	符号 / Symbol	名称 / Name	I/O
6	D1	数据输出位 D1 / Data output bit D1	O
7	D2	数据输出位 D2 / Data output bit D2	O
8	D3	数据输出位 D3 / Data output bit D3	O
9	D4	数据输出位 D4 / Data output bit D4	O
10	D5	数据输出位 D5 / Data output bit D5	O
11	D6	数据输出位 D6 / Data output bit D6	O
12	D7	数据输出位 D7 / Data output bit D7	O
13	D8	数据输出位 D8 / Data output bit D8	O
14	D9	数据输出位 D9 / Data output bit D9	O
15	GNDD	数字地 / Digital ground	/
16	VDDD	数字电源 / Digital supply	/
17	D10	数据输出位 D10 / Data output bit D10	O
18	D11	数据输出位 D11 / Data output bit D11	O
19	D12	数据输出位 D12 / Data output bit D12	O
20	D13	数据输出位 D13（MSB) / Data output bit D13 (MSB)	O
21	OR	超量程指示 / Over-range indicator	O
22	MODE	数据输出模式选择 / Output data mode select	I
23	SENSE	参考模式选择 / Reference mode select	I
24	VREF	参考电压 / Reference voltage	O
25	VREF−	差分参考负端 / Differential reference negative terminal	O
26	VREF+	差分参考正端 / Differential reference positive terminal	O
27	VDDA	模拟电源 / Analog supply	/
28	GNDA	模拟地 / Analog ground	/
29	IN+	差分输入正端 / Differential input positive terminal	I
30	IN−	差分输入负端 / Differential input negative terminal	I
31	GNDA	模拟地 / Analog ground	/
32	VDDA	模拟电源 / Analog supply	/

推荐工作条件 / Recommended Operating Conditions

- 模拟电源电压：3.0V~3.3V / Analog supply voltage: 3.0V to 3.3V
- 数字电源电压：2.5V~3.3V / Digital supply voltage: 2.5V to 3.3V
- 差分模拟输入电压：1Vpp~2Vpp / Differential analog input voltage: 1Vpp to 2Vpp
- 时钟频率范围：1MHz～50MHz / Clock frequency range: 1MHz to 50MHz
- 工作环境温度：-40°C≤TA≤85°C / Operating ambient temperature: -40°C ≤ TA ≤ 85°C

绝对最大额定值 / Absolute Maximum Ratings

- 模拟电源电压：3.9V / Analog supply voltage: 3.9V
- 数字电源电压：3.9V / Digital supply voltage: 3.9V
- 功耗：414mW / Power consumption: 414mW
- 贮存温度（Tstg）：-55°C~125°C / Storage temperature (Tstg): -55°C to 125°C
- 引线耐焊接温度 TH(10s)：260°C / Lead soldering temperature TH (10s): 260°C

性能指标 / Performance Specifications

测试条件（除另有规定外）：VDDA=3V，VDDD=2.5V，fCLK=50MHz，GNDA=GNDD=0V，fIN=0.97MHz，MODE=PDWN=SENSE=0V，内部 1V 基准，差分模拟输入范围 2VPP，-40°C≤TA≤85°C。

Test conditions (unless otherwise specified): VDDA=3V, VDDD=2.5V, fCLK=50MHz, GNDA=GNDD=0V, fIN=0.97MHz, MODE=PDWN=SENSE=0V, internal 1V reference, differential analog input range 2VPP, -40°C ≤ TA ≤ 85°C.

特性 / Characteristic	符号 / Symbol	最小 / Min	典型 / Typ	最大 / Max	单位 / Unit
分辨率 / Resolution	RES	—	14	—	bit
线性误差 / Linearity error	EL	-7.5	±3.40	7.5	LSB
微分线性误差 / Differential linearity error	EDL	-1.5	±0.90	1.5	LSB
失调误差 / Offset error	EO	-1.2	±0.09	1.2	%FSR
增益误差 / Gain error	EG	-4.16	±0.75	4.16	%FSR
基准输出电压 / Reference output voltage	VREF	0.965	0.985	1.035	V
数字输出高电平电压 / Digital output high-level voltage	VOH	2.4	2.5	—	V
数字输出低电平电压 / Digital output low-level voltage	VOL	—	0.003	0.1	V
模拟电源电流 / Analog supply current	IDDA	—	124	138	mA
数字电源电流 / Digital supply current	IDDD	—	6	10	mA
功耗 / Power consumption	PW	—	390	414	mW
信噪比 / Signal-to-noise ratio	SNR	65	67.8	—	dB
信噪失真比 / Signal-to-noise and distortion ratio	SINAD	64.5	67.5	—	dB
无杂散动态范围 / Spurious-free dynamic range	SFDR	70	78	—	dB
转换速率 / Conversion rate	SR	50	—	—	MSPS

注：典型值为常温测试数据。 Note: Typical values are room-temperature test data.

主要特性曲线图（电特性测试图）/ Typical Performance Curves

1、fCLK=50MHz，fIN=0.97MHz 条件下频谱图 1. Spectrum at fCLK=50MHz, fIN=0.97MHz

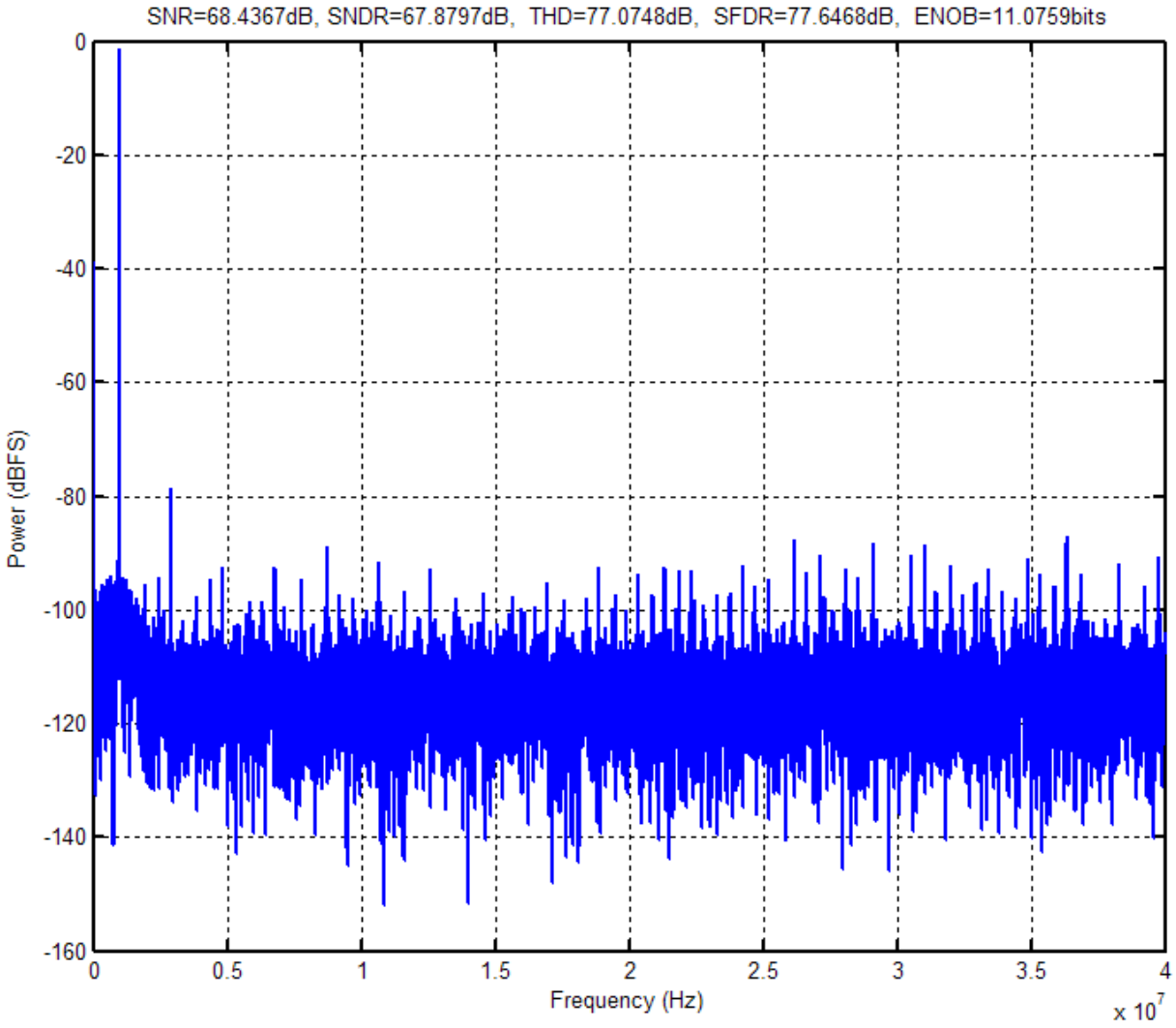


Figure 5: fCLK=50MHz，fIN=0.97MHz FFT 谱线 / FFT spectrum

2、fCLK=50MHz，fIN=9.7MHz 条件下频谱图 2. Spectrum at fCLK=50MHz, fIN=9.7MHz

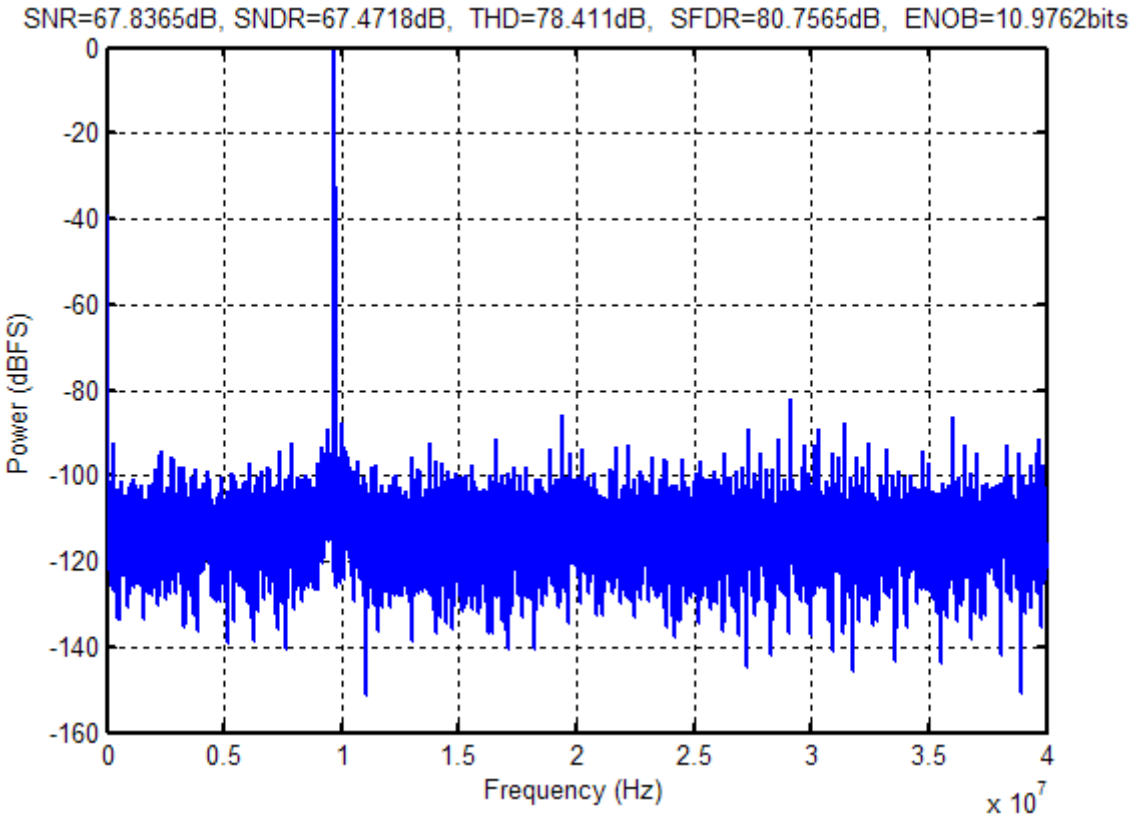


Figure 6: fCLK=50MHz，fIN=9.7MHz FFT 谱线 / FFT spectrum

3、微分误差（EDL）曲线 3. Differential error (EDL) curve

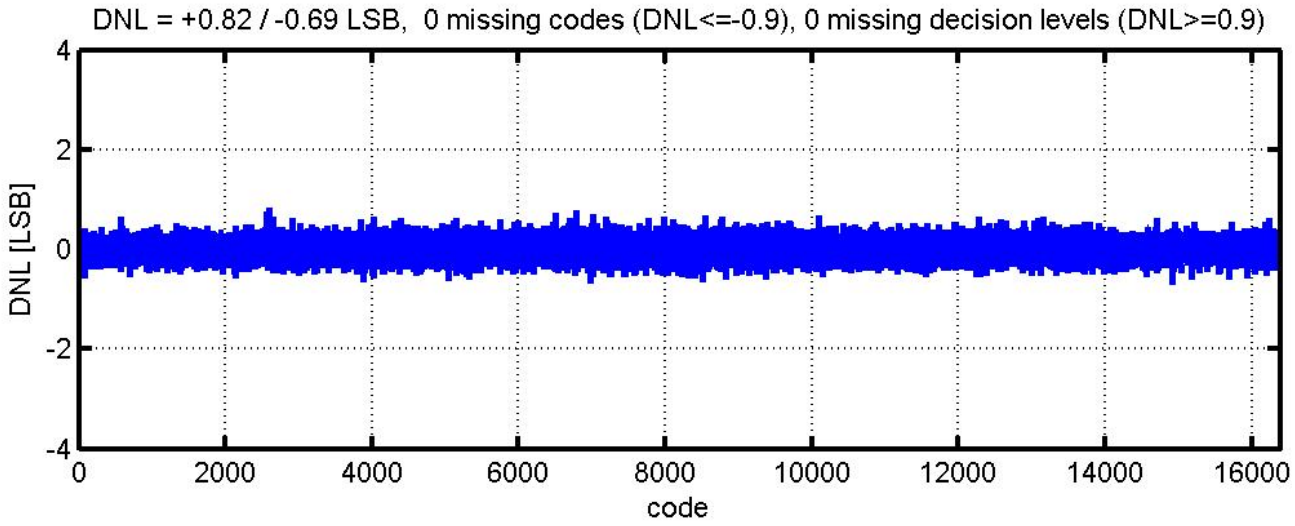


Figure 7: fCLK=50MHz，fIN=0.97MHz DNL 曲线 / DNL curve

4、线性误差（EL）曲线 4. Linearity error (EL) curve

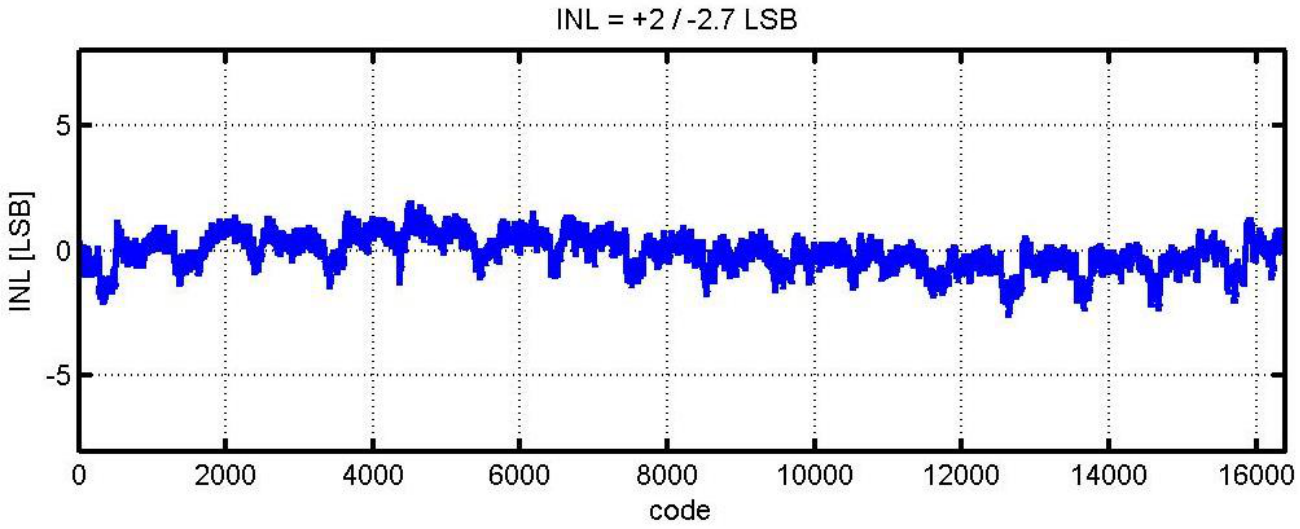


Figure 8: fCLK=50MHz，fIN=0.97MHz INL 曲线 / INL curve

典型应用线路图 / Typical Application Circuit

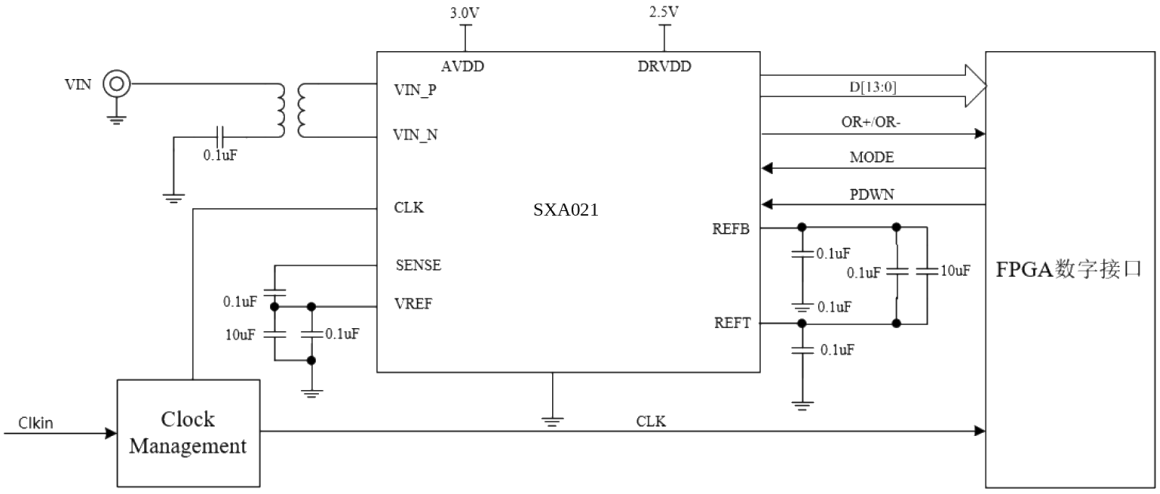


Figure 9: SXA021 应用电路图 / Application circuit

单元模块及工作原理 / Functional Description

1、原理概述 / General Description

SXA021 型 14 位 50MSPS A/D 转换器是采用 CMOS 工艺制造的半导体集成电路。该产品具有采样率高、信噪比高、线性误差小、CMOS 输出接口等特点。通过 SENSE、MODE、PDWN 等端口可对内部电路的工作模式和输出码格式进行配置。

The SXA021 14-bit 50MSPS A/D converter is a semiconductor integrated circuit fabricated in CMOS technology. The device features high sampling rate, high signal-to-noise ratio, small linearity error and a CMOS output interface. The operating mode of the internal circuits and the output code format can be configured via the SENSE, MODE, PDWN and other pins.

2、模拟输入范围及参考电压选择 / Analog Input Range and Reference Selection

SXA021 的模拟输入范围为 1VPP ～2VPP，可根据模拟输入范围对参考电压进行调整。电路内部产生稳定、精确的参考电压，使用时可选择内部参考，也可选用外部参考，还可通过编程确定其参考电压值（见图 10），使用方式由参考电压选择端 SENSE 控制，模拟输入范围与参考电压选择如表 1 所示。

The analog input range of the SXA021 is 1VPP to 2VPP, and the reference voltage can be adjusted according to the analog input range. The circuit internally generates a stable, accurate reference voltage; an internal reference or an external reference can be selected, and the reference voltage value can also be set by programming (see Figure 10). The configuration is controlled by the reference select pin SENSE. Analog input range vs. reference selection is shown in Table 1.

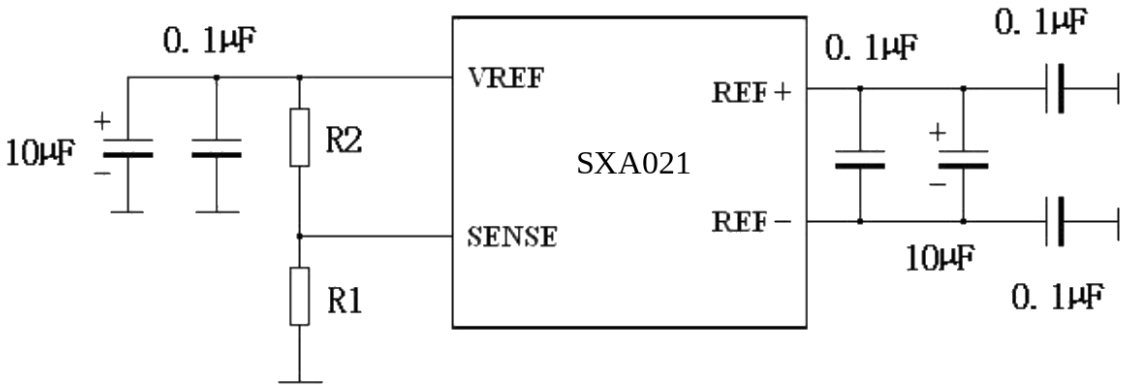


Figure 10: 可编程参考电压使用连接图 / Programmable reference voltage connection diagram

表1 模拟输入范围与参考电压选择使用连接表 / Table 1. Analog Input Range vs. Reference Selection

工作模式 / Mode	SENSE	参考电压输出 VREF / Reference Output VREF	差分模拟输入峰值电压 VPP / Differential Input Peak Voltage VPP
外加参考电压 / External reference	VDDA	——	2×外加参考电压 / 2× external reference voltage
固定内参考电压 / Fixed internal reference	VREF	0.5V	1.0V
可编程参考电压(见图 13) / Programmable reference (see Fig. 13)	0.2V～VREF	0.5V×(1+R2/R1)	2×VREF
固定内参考电压 / Fixed internal reference	≤0.2V	1.0V	2.0V

3、模拟输入 / Analog Inputs

SXA021 模拟输入可以采用差分输入的形式，也可采用单端输入的形式。差分输入模式可采用放大器驱动，也可采用变压器驱动，如图 11 所示。单端输入结构如图 12 所示。

The SXA021 analog input can be differential or single-ended. The differential input mode can be driven by an amplifier or by a transformer, as shown in Figure 11. The single-ended input configuration is shown in Figure 12.

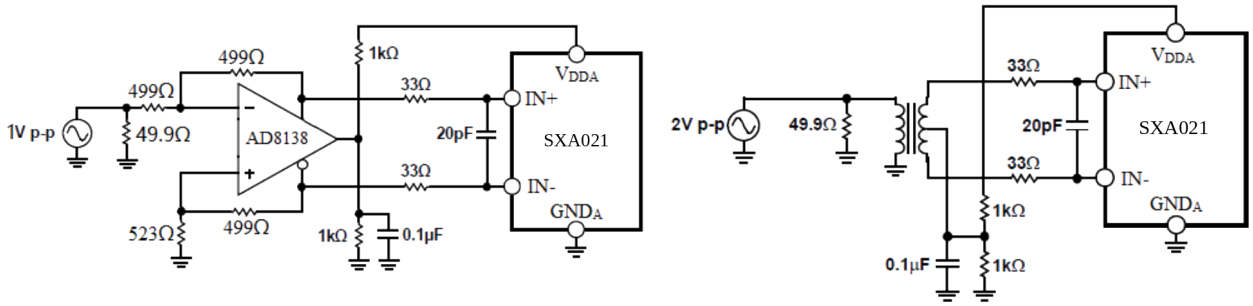


Figure 11: SXA021 差分输入结构（a）放大器驱动（b）变压器驱动 / Differential input configuration: (a) amplifier drive, (b) transformer drive

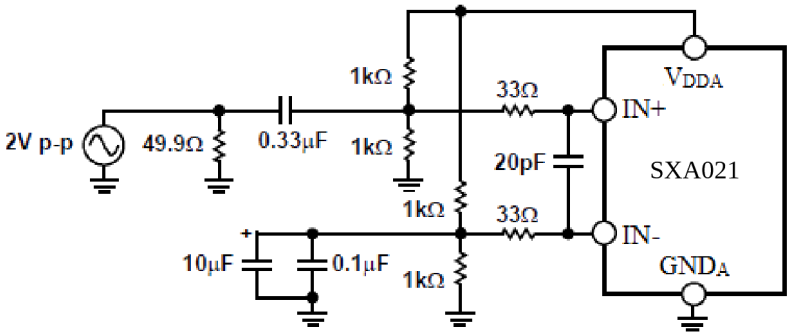


Figure 12: SXA021 单端输入结构 / Single-ended input configuration

4、省电模式 / Power-Down Mode

本产品设有省电模式控制端 PDWN，PDWN 为高电平时，电路处于省电模式，各输出为高阻状态；PDWN 为低电平时，电路处于正常工作状态。省电模式控制如表 2 所示。

This device provides a power-down mode control pin PDWN. When PDWN is high, the circuit enters power-down mode with all outputs in a high-impedance state; when PDWN is low, the circuit operates normally. Power-down mode control is shown in Table 2.

表2 SXA021 省电模式控制表 / Table 2. SXA021 Power-Down Mode Control

PDWN	功能 / Function
H	省电模式 / Power-down mode
L	正常工作 / Normal operation

注：PDWN 控制电平为 CMOS 电平，悬空为低电平（L）。 Note: The PDWN control level is CMOS level; floating defaults to low level (L).

5、时钟输入 / Clock Input

SXA021 输入时钟为方波或正弦波均可正常工作，但需确保占空比在 50%附近。输入时钟为方波时，高电平与电源电压 AVDD 保持一致，低电平与 AGND 保持一致；输入时钟为正弦波时，电压范围为 AGND~AVDD。

The SXA021 input clock works with either a square wave or a sine wave, provided the duty cycle is near 50%. With a square-wave input clock, the high level shall be consistent with the AVDD supply voltage and the low level consistent with AGND; with a sine-wave input clock, the voltage range is AGND to AVDD.

6、输出数据格式及时钟占空比稳定功能 / Output Data Format and Duty Cycle Stabilizer

SXA021 的输出数据有两种格式：二进制补码和二进制偏移码，用户可根据需要通过 MODE 进行控制；电路内部含有时钟占空比稳定电路，也可通过 MODE 进行选择，控制如表 3 所示。

The SXA021 output data has two formats: two's complement and offset binary, selectable by the user via MODE. The circuit includes an internal clock duty cycle stabilizer, also selectable via MODE, as shown in Table 3.

表3 SXA021 输出数据格式及时钟稳定功能控制表 / Table 3. Output Data Format and Duty Cycle Stabilizer Control

MODE	输出数据格式 / Output Data Format	时钟占空比稳定功能 / Duty Cycle Stabilizer
VDDA	二进制补码 / Two's complement	关闭 / Off
2/3 VDDA	二进制补码 / Two's complement	开启 / On
1/3 VDDA	二进制偏移码 / Offset binary	开启 / On
GNDA（默认值）/ GNDA (default)	二进制偏移码 / Offset binary	关闭 / Off

电源地间保护 / Power Supply Protection

为提高器件的抗静电能力，器件内部的各个电源引脚之间存在如下静电保护回路，每个 ESD 保护管的正向导通电压约 0.65V，上电及正常使用中应避免这些 ESD 保护管长时间正向导通。

To improve the ESD immunity of the device, ESD protection circuits exist between the power pins inside the device as shown below. The forward conduction voltage of each ESD protection device is approximately 0.65V; prolonged forward conduction of these ESD protection devices shall be avoided during power-up and normal operation.

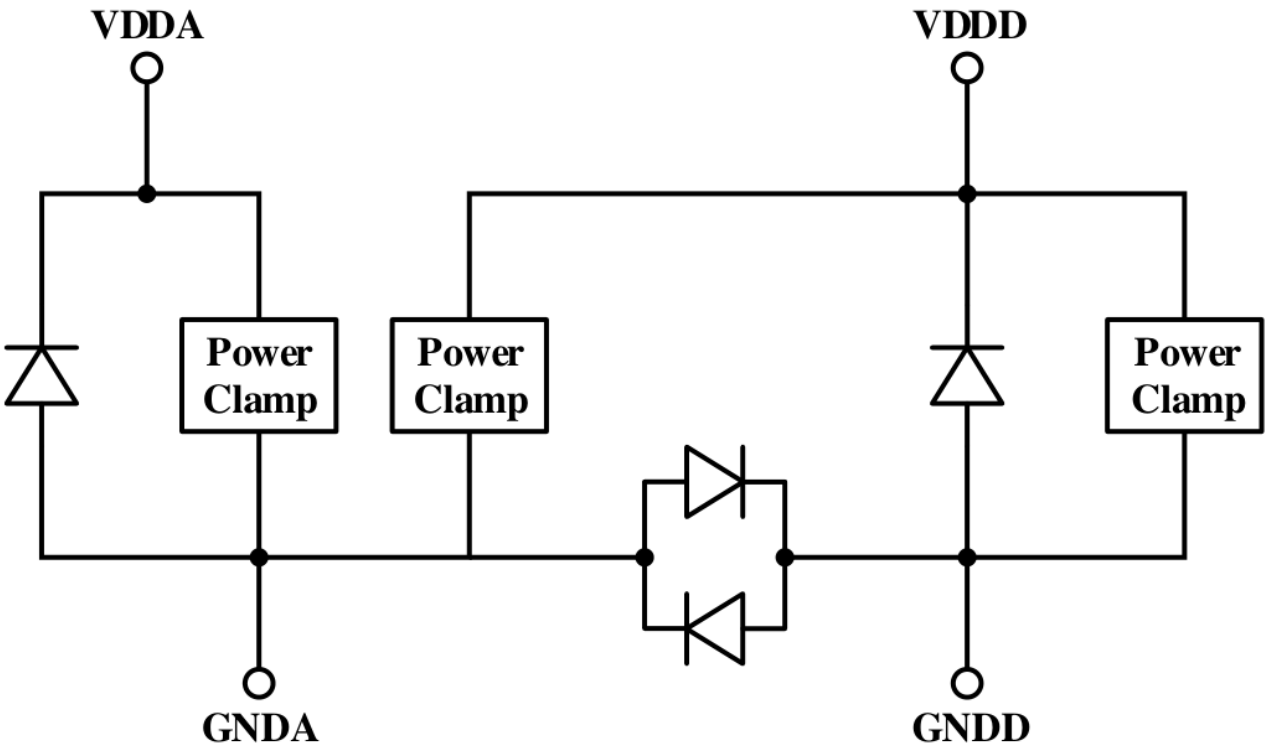


Figure 13: SXA021 电源、地间的静电保护示意图 / ESD protection schematic between power supplies and grounds

注意事项 / Cautions

1、产品安装注意事项 / Installation Notes

1) 焊接时请注意器件方向，以免焊错。 1) Pay attention to device orientation during soldering to avoid misalignment.

2) 调试电路所用的仪器、仪表一定要有良好的统一接地。PCB 板设计请务必保持接地良好、电源去耦。 2) Instruments used for circuit debugging must share a good common ground. PCB design must ensure solid grounding and power supply decoupling.

3) 应注意不要将电源接反及输入输出端与电源短路，易造成电路损坏。 3) Do not reverse the power supply or short input/output pins to the supply, as this can easily damage the circuit.

2、产品使用注意事项 / Usage Notes

1) 上电要求：推荐模拟电源、数字电源同时上电或模拟电源先上电。 1) Power-up requirement: it is recommended to power the analog and digital supplies simultaneously, or to power the analog supply first.

2) 为保证电路动态性能，建议逻辑输入端口（INCLK、PDWN）的逻辑输入高电平≥2.8V，逻辑输入低电平≤0.2V。 2) To ensure dynamic performance, the logic input high level at the logic input pins (INCLK, PDWN) is recommended to be ≥2.8V and the logic input low level ≤0.2V.

3) SXA021 前端使用运放时，运放的输出摆幅需大于 SXA021 的模拟输入范围，以保证输入信号的完整性。 3) When an op amp is used at the front end of the SXA021, the op amp output swing must exceed the analog input range of the SXA021 to preserve input signal integrity.

4) SXA021 基准输出端（VREF、VREF+、VREF-）的去耦电容采用 ESR 较小的电容。 4) Use low-ESR capacitors for decoupling at the SXA021 reference output pins (VREF, VREF+, VREF-).

5) 应用中，建议 PCB 大面积接地。这样可以消除由于接地点的不同而可能存在的电位不同，同时可以降低电路板产生的电容对电路的影响。 5) In application, large-area PCB grounding is recommended. This eliminates potential differences that may exist due to different grounding points, and reduces capacitive effects of the circuit board on the circuit.

6) 每个电源引脚需要就近接 1 个 1μF 或 0.1μF 的电容。 6) Each power pin requires one 1μF or 0.1μF capacitor placed close to the pin.

7) 模拟输入部分，如果采取差分输入，差分输入部分走线必须等长。 7) For the analog input section, if differential input is used, the differential input traces must be length-matched.

8) 数字电源和模拟电源需要分开。 8) Digital and analog power supplies shall be separated.

9) 数字输出走线尽可能短，建议后级接数字驱动器。 9) Keep digital output traces as short as possible; a digital driver is recommended at the following stage.

3、产品防护注意事项 / Protection Notes

1) 该电路所有引出端均设计有静电保护结构，不过大能量电脉冲仍然可能损坏电路，因此在测试、搬运、储藏过程中，应注意静电防护。 1) All pins of this circuit are designed with ESD protection structures, but high-energy electrical pulses may still damage the circuit; therefore ESD precautions shall be observed during testing, handling and storage.

2) 超出绝对最大额定值可能会导致器件永久性损坏。这只是额定最值，不表示在这些条件下或者在任何其它超出本产品手册中所示的条件下，器件能够正常工作。 2) Exceeding the absolute maximum ratings may cause permanent damage to the device. These are maximum ratings only , and do not imply that the device will operate normally under these conditions or any other conditions beyond those stated in this manual.

3) 在避免雨、雪直接影响的条件下，装有产品的包装箱可以用安全的运输工具运输。但不能和带有酸性、碱性和其它腐蚀性物体堆放在一起。包装应是安全的，可以采用现有的运输工具。 3) Packed products may be transported by safe means of transport provided direct exposure to rain and snow is avoided. They shall not be stacked together with acidic, alkaline or other corrosive materials. Packaging shall be secure, and existing means of transport may be used.

4) 包装好的产品贮存环境应满足 Q/W 657A 第 8.1 规定的 I 类库房条件要求（温度：15°C~25°C，湿度：25%~65%），周围没有酸、碱或其它腐蚀性气体，通风良好，且具备相应防静电措施。 4) The storage environment for packed products shall meet the Class I warehouse requirements of Q/W 657A Section 8.1 (temperature: 15°C to 25°C, humidity: 25% to 65%), with no acids, alkalis or other corrosive gases nearby, good ventilation, and appropriate ESD precautions.

4、电装说明 / Assembly Instructions

1) 本产品潮湿敏感等级为 MSL3，将产品从防潮袋中取出、进行干燥储存或烘干后到回流焊前所暴露在外部环境的允许时间为：≤30°C/60RH%，168h； 1) This product has a moisture sensitivity level of MSL3. After removal from the moisture-barrier bag, dry storage or baking, the allowable exposure time to the ambient environment before reflow soldering is: ≤30°C/60RH%, 168h.

2) 若器件储存条件无法控制或追溯，请在电装前严格执行 125°C，8h 烘烤； 2) If device storage conditions cannot be controlled or traced, bake at 125°C for 8h strictly before assembly.

3) 若电装环境温湿度无法保证≤30°C/60RH%，请在烘烤后 12h 内完成焊接； 3) If the assembly environment temperature/humidity cannot be guaranteed at ≤30°C/60RH%, complete soldering within 12h after baking.

4) 产品烘烤后，极易产生静电，所有操作过程需要注意 ESD 防护； 4) After baking, the product is highly susceptible to static electricity; ESD precautions are required throughout all handling.

5) 板级组装采用有铅回流焊（Sn63Pb37）时，推荐峰值温度范围 210°C~235°C，最大峰值温度不建议超过 235°C，峰值温度±5°C以内停留时间≤20s，液相线以上停留时间 60~90s，升温速率 2~4°C/s，降温速率 2~6°C/s； 5) For board-level assembly with leaded reflow soldering (Sn63Pb37), the recommended peak temperature range is 210°C to 235°C, with maximum peak temperature not exceeding 235°C; dwell time within ±5°C of peak temperature ≤20s, time above liquidus 60 to 90s, ramp-up rate 2 to 4°C/s, ramp-down rate 2 to 6°C/s.

6) 板级组装采用无铅回流焊（SAC305）时，推荐峰值温度范围 230°C~245°C，最大峰值温度不建议超过 260°C，峰值温度±5°C以内停留时间≤20s，液相线以上停留时间 60~90s，升温速率 2~4°C/s，降温速率 2~6°C/s； 6) For board-level assembly with lead-free reflow soldering (SAC305), the recommended peak temperature range is 230°C to 245°C, with maximum peak temperature not exceeding 260°C; dwell time within ±5°C of peak temperature ≤20s, time above liquidus 60 to 90s, ramp-up rate 2 to 4°C/s, ramp-down rate 2 to 6°C/s.

7) 若混合电装工艺需要温度升高，应保证器件本体温度最高不超过 260°C（器件本体温度测量点位于回流焊时器件上表面）； 7) If a mixed assembly process requires higher temperature, ensure the device body temperature does not exceed 260°C (measured at the top surface of the device during reflow).

8) 本产品器件焊端镀层为镍钯金。 8) The terminal plating of this device is nickel-palladium-gold (NiPdAu).

5、热阻 / Thermal Resistance

表4 封装热阻 / Table 4. Package Thermal Resistance

项目 / Item	实测值 / Measured Value	依据标准及方法 / Standard & Method
Rthja（结到环境的热阻）/ Rthja (junction-to-ambient thermal resistance)	55.53 K/W	JESD51-2 集成电路自然对流热测试环境要求及测试方法 / JESD51-2 natural convection thermal test requirements and method for integrated circuits
	9.389 K/W	JESD51-14 一维传热路径双界面分离法 / JESD51-14 two-interface separation method for one-dimensional heat transfer path

项目 / Item	实测值 / Measured Value	依据标准及方法 / Standard & Method
Rthjt（结到器件顶面的热阻）/ Rthjt (junction-to-package-top thermal resistance)		
Rthj-bottom（结到器件底面的热阻）/ Rthj-bottom (junction-to-package-bottom thermal resistance)	9.163 K/W	JESD51-14 拐点理论器件内部结构分层得到 / JESD51-14 inflection-point theory with layered device internal structure
Rthj-board（结到 PCB 板背面的热阻）/ Rthj-board (junction-to-PCB-backside thermal resistance)	33.7K/W	JESD51-14 一维传热路径双界面分离法 / JESD51-14 two-interface separation method for one-dimensional heat transfer path

常见故障及处理办法 / Troubleshooting

1、无信号输出：检查电源电压、输入信号、时钟是否正确加载。 1. No signal output: check that the supply voltage, input signal and clock are applied correctly.

2、器件功能不正常：明确器件工作模式，确认配置是否正确。 2. Device malfunction: identify the operating mode of the device and verify the configuration is correct.

3、器件工作不稳定：检查电源，保证电源电压稳定。 3. Unstable operation: check the power supply and ensure the supply voltage is stable.

联系方式 / Contact

项目 / Item	内容 / Value
联系人 / Contact	Felix (Flip) Lai, CEO at Shenxin Tech
邮箱 / Email	felix@shenxinic.com
电话 / Phone	+852 51367095
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附加说明 / Additional Notes

1. 本说明书首次发布日期：2026 年 7 月。
2. This manual was first issued in July 2026.
3. 本产品状态：☑生产（该产品型号目前已在生产，可以提供正式产品） ☐预发布（该产品型号尚未投入正式生产，可以提供样品）
4. Product status: ☑ In production (this model is currently in production; formal products are available) ☐ Pre-release (this model is not yet in formal production; samples are available)
5. 替代进口器件情况说明：

6. Notes on replacing the imported device:

1）绝对最大额定值对比 / Absolute Maximum Ratings Comparison

附表1 绝对最大额定值对比 / Appendix Table 1. Absolute Maximum Ratings Comparison

参数 / Parameter	SXA021 规范要求 / SXA021 Spec	进口器件手册 / Imported Device Datasheet	比对结果 / Comparison
模拟电源电压 VDDA / Analog supply voltage VDDA	3.9V	3.9V	一致 / Consistent
数字电源电压 VDDD / Digital supply voltage VDDD	3.9V	3.9V	一致 / Consistent
功耗（PW) / Power consumption (PW)	414mW	375mW	不一致 / Different
贮存温度（Tstg) / Storage temperature (Tstg)	-55°C~125°C	-65°C~125°C	不一致 / Different
引线耐焊接温度 TH / Lead soldering temperature TH	260°C	300°C	不一致 / Different

2）推荐工作条件对比 / Recommended Operating Conditions Comparison

附表2 推荐工作条件对比 / Appendix Table 2. Recommended Operating Conditions Comparison

参数 / Parameter	SXA021 规范要求 / SXA021 Spec	进口器件手册 / Imported Device Datasheet	比对结果 / Comparison
模拟电源电压 VDDA / Analog supply voltage VDDA	3.0V~3.3V	2.7V~3.6V	不一致 / Different
数字电源电压 VDDD / Digital supply voltage VDDD	2.5V~3.3V	2.25V~3.6V	不一致 / Different
输入信号幅度范围（峰峰值）/ Input signal amplitude range (peak-to-peak)	1.0Vpp~2.0Vpp	1.0Vpp~2.0Vpp	一致 / Consistent
工作环境温度（TA) / Operating ambient temperature (TA)	-40°C~85°C	-40°C~85°C	一致 / Consistent

3）电特性对比 / Electrical Characteristics Comparison

附表3 电特性对比 / Appendix Table 3. Electrical Characteristics Comparison

参数 / Parameter	符号 / Symbol	条件 / Condition	SXA021 参考值 / SXA021 Reference			进口器件手册参考值 / Imported Device Reference			说明 / Note	单位 / Unit
			最小值 / Min	典型值 / Typ	最大值 / Max	最小值 / Min	典型值 / Typ	最大值 / Max		
分辨率 / Resolution	RES	—	14			14			一致 / Consistent	bit
线性误差 / Linearity error	EL	—	-7.5	±3.4	7.5	-5.55	±1.6	5.55	偏大 / Larger	LSB
微分误差 / Differential error	EDL	—	-1.5	±0.9	1.5	-1.0	±0.5	1.0	偏大 / Larger	LSB
失调误差 / Offset error	EO	—	-1.2	±0.5	1.2	-1.75	±0.5	1.75	偏小 / Smaller	%FSR
增益误差 / Gain error	EG	—	-4.16	±0.75	4.16	-6.9	±0.5	6.9	偏大 / Larger	%FSR
基准输出电压 / Reference output voltage	VREF	—	0.965	0.985	1.035	0.965	—	1.035	偏小 / Smaller	V
数字输出高电平电压 / Digital output high-level voltage	VOH	—	2.4	—	—	2.49	—	—	偏小 / Smaller	V
数字输出低电平电压 / Digital output low-level voltage	VOL	—	—	—	0.1	—	—	0.05	偏大 / Larger	V
模拟电源电流 / Analog supply current	IDDA	—	—	124	138	—	100	—	偏大 / Larger	mA
数字电源电流 / Digital supply current	IDDD	—	—	6	10	—	7	—	偏大 / Larger	mA
功耗 / Power consumption	PW	—	—	390	414	—	320	375	偏大 / Larger	mW
信噪比 / Signal-to-noise ratio	SNR	fIN=2.4MHz	65	67.8	—	—	73.1	—	偏小 / Smaller	dBc
信噪失真比 / Signal-to-noise and distortion ratio	SINAD	fIN=2.4MHz	64.5	67.5	—	—	73.0	—	偏小 / Smaller	dBc
无杂散动态范围 / Spurious-free dynamic range	SFDR	fIN=2.4MHz	70	82	—	—	92.0	—	偏小 / Smaller	dBc

4）其它指标对比 / Other Specifications Comparison

附表4 其它指标对比 / Appendix Table 4. Other Specifications Comparison

参数 / Parameter	SXA021 / SXA021	进口器件 / Imported Device	比对结果 / Comparison
封装形式 / Package type	QFN32	LFCSP_WQ，CP-32-7	不一致 / Different
质量等级 / Quality grade	企标 / Enterprise standard	工业级 / Industrial grade	不一致 / Different
尺寸 / Dimensions	5mm×5mm×0.75mm	5mm×5mm×0.75 mm	一致 / Consistent
替代建议 / Replacement recommendation	□直接替代 ☑有效替代 □功能替代 / □ Direct replacement ☑ Effective alternative □ Functional alternative	—	—

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