ZZSOP77AA Type
Ultra-low Offset Operational Amplifier

Summary

The ZZSOP77AA ultra-low offset operational amplifier is manufactured in compliance with the 'GJB597B-2012 General Specifications for Semiconductor Integrated Circuits' and 'GJB548 B-2005 Test Methods and Procedures for Microelectronic Devices' standards, achieving a National Military Standard Class B quality rating. Custom Class S products are available upon request.

Product Technical Advantages:

- Ultra-low offset voltage: The ZZSOP77AA achieves an offset voltage as low as 25 μV through wafer-level calibration technology.
- Excellent temperature (time) drift and noise performance: ultra-low offset voltage temperature drift below 0.3 μV/℃; below 1.5 μV/month ultra-low drift voltage with sub-0.6 μVp-p low noise performance.
- The ZZSOP77AA features a convenient offset voltage adjustment method through external resistor connection, significantly enhancing circuit flexibility and ensuring consistent offset voltage across multiple circuits.
- Outstanding comprehensive performance: -Wide operating temperature range from-55℃ to +125℃, ±13V input voltage range, common-mode rejection ratio (CMRR) of at least 120dB, linear gain of at least 5000V/mV, and power consumption below 60mW.
- The OP77A product, fully pin and performance equivalent to imported foreign models, is compatible with OP07 product pins.

Apply

- wireless base station control circuit
- fiber optic network control circuit
- instrumentation amplifier
- Sensor and Control Thermocouple
- precision filter

Introduction End Arrangement

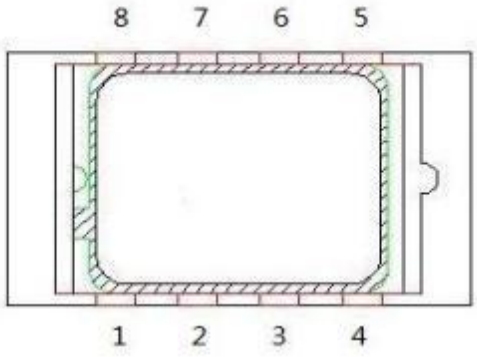


Figure 1: Input Port Arrangement

Exit	Symbol	Function	Exit	Symbol	Function
1	V_{OS} TRIM	Dysregulation module	8	V_{OS} TRIM	Dysregulation module
2	-IN	Negative input terminal	7	V+	Positive power supply
3	+IN	Positive input terminal	6	V_{OUT}	Outlet end
4	V-	Negative power source	5	NC	Barefoot

Table 1 Pin Functions (Top View)

Function Declaration

The circuit logic structure diagram shall comply with the requirements specified in Figure 2.

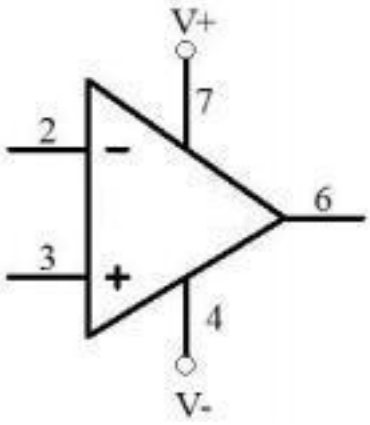


Figure 2 Circuit Logic Structure Diagram

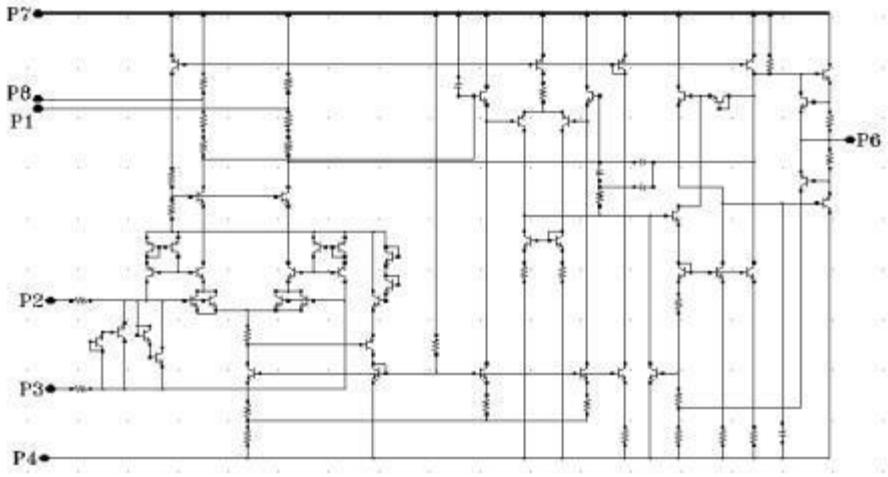
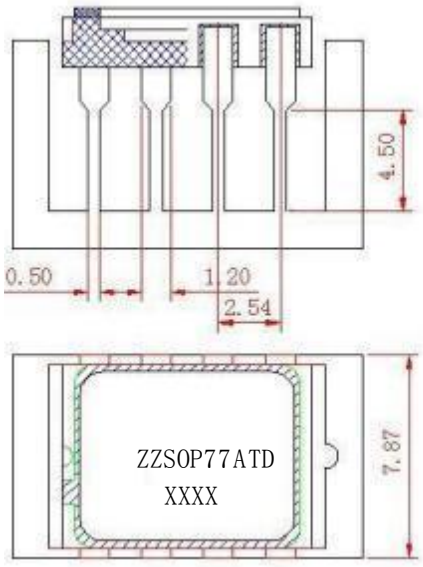

P7
P8
P1
P6
P2
P3
P4

Figure 3 Internal Simplified Circuit Diagram

Encapsulation Form

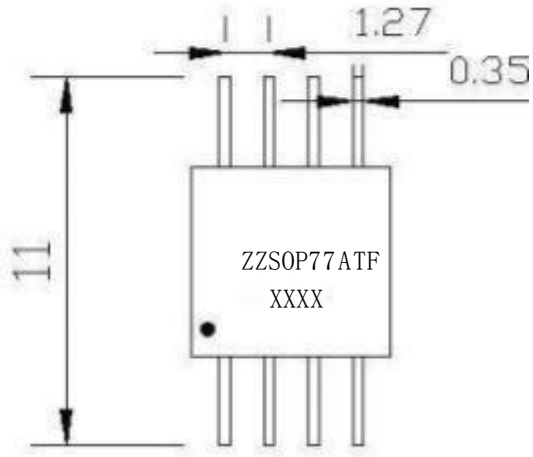
Model	Encapsulation form	Temperature range	Characteristic parameter	Encapsulation size diagram
ZZSOP77TD	8 lead double row direct insertion	−55℃ ≤ T_A ≤ +125℃	$V_{OS\ MAX}$=25 μV	See Figure 4
ZZSOP77TF	8 lead ceramic flat		$V_{OS\ MAX}$=25 μV	See Figure 5
ZZSOP77AA	Provide bare die		_	See Figure 6
ZZSOP77AA	Customize packaging based on user requirements		_	_

Table 2 Packaging Form Description Table



unit： mm

Figure 4-8: Leadless Dual-Column Straight-Jam Package Dimensions



unit： mm

Figure 5-8 Lead Ceramic Flat Package Dimensions

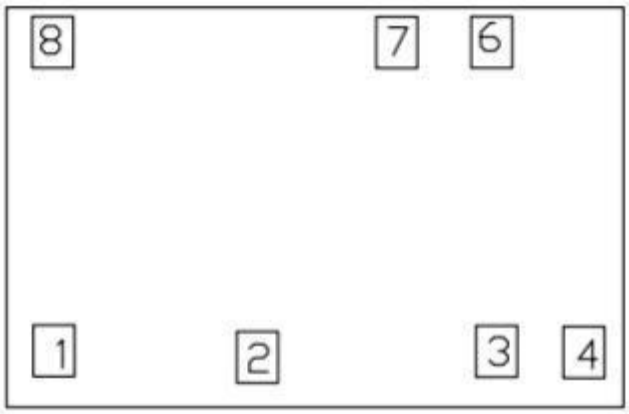


Figure 6 Schematic Diagram of Chip Size

Chip size	2.45*1.65（mm）
Weld size	100*100 （ μm）
Welding material	ALSi（Si%），1.2±0.1 μm

Table 3

Electrical Parameter Meter

Test item	Symbol	Test condition	Extreme		Unit	Temperature requirement
						-55℃≤T_A≤+125℃
			Minimum	Maximum		Unless otherwise specified
Offset voltage	V_{OS}	Vs=±15V	-25	25	μV	T_A=25℃
			-60	60		
Offset current	I_{OS}	Vs=±15V	-2	2	nA	T_A=25℃
			-2.2	2.2		
Input bias current (same-phase)	I_B+	Vs=±15V	-0.2	2		T_A=25℃
			-0.2	4	nA	
Input bias current (opposition)	I_B−	Vs=±15V	-0.2	2	nA	T_A=25℃
			-0.2	4		
Open loop voltage gain	A_{VO}	Vs=±15V	5000	—	V/mV	T_A=25℃
			2000	—		
Cmrr	CMRR	Vs=±15V	120	—	dB	
Positive power supply Pressure suppression ratio	PSRR+	Vs=±3V~±18V	—	3	μV/V	
Negative power supply	PSRR−	Vs=±3V~±18V	—	3	μV/V	

Pressure suppression ratio						
Output voltage	VO+	RL=10K	13.5	—	V	T_A=25℃
			12	—	V	
Output voltage	VO−	RL=10K	—	-13.5	V	T_A=25℃
			—	-12	V	
Output voltage	VO+	RL=2K	12.5	—	V	T_A=25℃
Output voltage	VO−	RL=2K	—	-12.5	V	T_A=25℃
Quiescent dissipation	PS	Vs=±15V	—	60	mW	T_A=25℃
			—	75	mW	
Quiescent dissipation	PS	Vs=±3V	—	4.5	mW	T_A=25℃
Swing rate	SR+	Vs=±15V	0.1	—	V/ μS	T_A=25℃
Swing rate	SR−	Vs=±15V	0.1	—	V/ μS	T_A=25℃

Table 4 Electrical Characteristics of ZSOP77A

Precautions for Circuit Use

✧ The Limit Working Condition of Circuit and the Attention to It

Name	Extreme	Explain
Power Supply Voltage (VCC)	±22V	
Input voltage (VIN)	±V_{CC}	
Range of differential input voltage	±30V	If the differential input voltage exceeds ±0.7V, the input current must be limited to ±10mA.
Output short circuit duration	Infinite length	The voltage (Vs) should be ±15V, and the temperature (TA) should be 25°C. Both temperature and supply voltage must be controlled to ensure they do not exceed the rated power.
Pin temperature	+300℃	Welding duration <60 seconds.
Storage temperature range	-65℃~+150℃	
Junction temperature (TJ)	+175℃	For short-term testing (168 hours in specific aging and steady-state life test configurations), TJ = +175°C.
Maximum dissipative power (PD)	500mW	The maximum power consumption is at ambient temperature of 25℃.
Core bonding	_	Increase the bonding wire arc radius to prevent short-circuiting between the bonding wire and the chip groove area. Automatic bonding is recommended, with a wire diameter of 25 μm.
Coreless package	_	The moisture content should be controlled according to the national military standard, with a recommended level of <1000 PPM.

Table 5

Note: Exceeding the absolute maximum rated values listed above may cause permanent damage to the device. These are merely emphasized ratings and do not cover functional operation under these or any other conditions beyond the technical specifications. Prolonged operation at absolute maximum rated values may affect the device's reliability.

✧ ESD warn

The ZZSOP77AA circuit is ESD-sensitive. Static charges can easily accumulate on both human bodies and test equipment, potentially discharging unnoticed. Although this product features a dedicated ESD protection circuit with a withstand voltage of up to 2000V, permanent device damage may occur during high-energy static discharge. Therefore, implementing appropriate ESD protection measures is recommended to prevent performance degradation or functional loss.

- Recommended operating conditions

  Power supply voltage range: ±3V to ±20.0V.

  Operating environment temperature: -55℃ to +125℃ .

Physical Image