

1. 特性

- 低失调电压: 10 μ V (最大值)
- 零漂移: 0.085 μ V/ $^{\circ}$ C (最大值)
- 低噪声: 11.6nV/ $\sqrt{\text{Hz}}$
 - 0.1Hz 至 10Hz 噪声: 0.26 μ V_{PP}
- 出色的直流精度:
 - 电源抑制比: 143dB
 - 共模抑制比: 148dB
 - 开环增益: 154dB
- 增益带宽: 2.2MHz
- 静态电流: 600 μ A (典型值)
- 宽电源范围: \pm 2.25V 至 \pm 20V
- 轨到轨输出
- 输入包括负轨
- RFI 滤波输入
- 1/2 通道

2. 应用

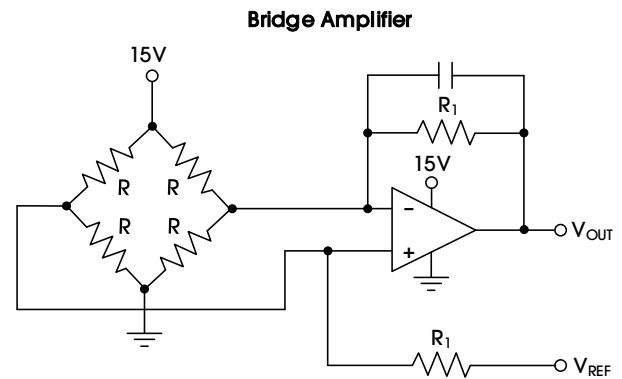
- 桥式放大器
- 应变片
- 传感器应用
- 温度测量
- 电子秤
- 医疗仪器
- 电阻温度检测器

3. 说明

OPZ302/3022 器件是支持 4.5V 至 40V 电源范围的高性能通用运算放大器。OPZ302/3022 运算放大器具有 10 μ V (最大值) 的极低输入失调电压和 148dB 的高 CMRR, 可提供出色的初始精度和轨到轨输出。这些器件适用于方便的单电源便携式设备和差分输出场景。

OPZ302/3022 系列提供高达 2.2MHz 的带宽、3.8V/ μ s 的转换率和出色的直流性能, 非常适合有源滤波器电路。

OPZ302/3022 运算放大器采用 SOT23-5 和 SOIC-8 封装。所有版本的额定温度范围为 -40° C 至 125° C。有关订购信息, 请参见 Table 1。



OPZ302/OPZ3022

40V, High-Performance, General-Purpose, Zero-Drift Operational Amplifiers

Table 1 lists the order information.

Table 1. Order Information

ORDER NUMBER	CH (#)	PACKAGE	MARK	V _{OS} (MAX) (μV)	V _{CC} (V)	I _Q PER CH (TYP) (μA)	GBW (kHz)	SLEW RATE (TYP) (V/μs)	NOISE (TYP) (nV/√Hz)	RAIL-TO-RAIL	OP. TEMP (°C)	RATING	PKG. OPTION
OPZ302BSOT235	1	SOT23-5	OPZ302	±10	4.5-40	600	2200	3.8	11.6	IN/OUT	-40-125	Industry	T/R-3000
OPZ302BSOIC8	1	SOIC-8	OPZ302	±10	4.5-40	600	2200	3.8	11.6	IN/OUT	-40-125	Industry	T/R-4000
OPZ3022BSOIC8	2	SOIC-8	OPZ3022	±10	4.5-40	600	2200	3.8	11.6	IN/OUT	-40-125	Industry	T/R-4000

Table 2. Family Selection Guide

ORDER NUMBER	CH (#)	PACKAGE	MARK	V _{OS} (MAX) (μV)	V _{CC} (V)	I _Q PER CH (TYP) (μA)	GBW (kHz)	SLEW RATE (TYP) (V/μs)	NOISE (TYP) (nV/√Hz)	RAIL-TO-RAIL	OP. TEMP (°C)	RATING	PKG. OPTION
OPZ102BSOT235	1	SOT23-5	OPZ102	±15	4.5-40	150	300	0.8	35	IN/OUT	-40-125	Industry	T/R-3000
OPZ102BSOIC8	1	SOIC-8	OPZ102	±15	4.5-40	150	300	0.8	35	IN/OUT	-40-125	Industry	T/R-4000
OPZ1022BSOIC8	2	SOIC-8	OPZ1022	±15	4.5-40	150	300	0.8	35	IN/OUT	-40-125	Industry	T/R-4000
OPZ202BSOT235	1	SOT23-5	OPZ202	±10	4.5-40	300	1000	2.8	17.6	IN/OUT	-40-125	Industry	T/R-3000
OPZ202BSOIC8	1	SOIC-8	OPZ202	±10	4.5-40	300	1000	2.8	17.6	IN/OUT	-40-125	Industry	T/R-4000
OPZ2023BSOIC8	2	SOIC-8	OPZ2023	±10	4.5-40	300	1000	2.8	17.6	IN/OUT	-40-125	Industry	T/R-4000

Devices can be ordered via the following two ways:

1. Place orders directly on our website (www.analogyssemi.com), or;
2. Contact our sales team by mailing to sales@analogyssemi.com.

4. PIN CONFIGURATION AND FUNCTIONS

Figure 1 illustrates the pin configuration (1 CH devices).

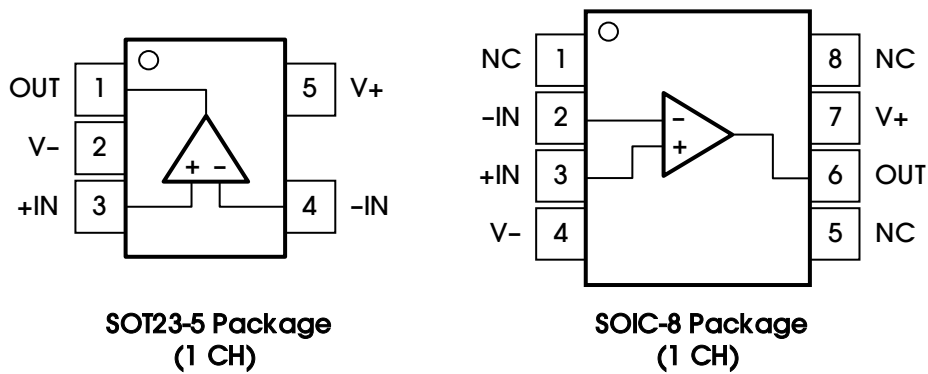


Figure 1. Pin Configuration (1 CH Devices)

Table 3 lists the pin functions (1 CH devices).

Table 3. Pin Functions (1 CH Devices)

POSITION		NAME	TYPE	DESCRIPTION
SOT23-5	SOIC-8			
1	6	OUT	Output	Output
2	4	V-	Power	Negative (lowest) power supply
3	3	+IN	Input	Positive (non-inverting) input
4	2	-IN	Input	Negative (inverting) input
5	7	V+	Power	Positive (highest) power supply
—	1, 5, 8	NC	I/O	No internal connection (can be left floating)

Figure 2 illustrates the pin configuration (2 CH devices).

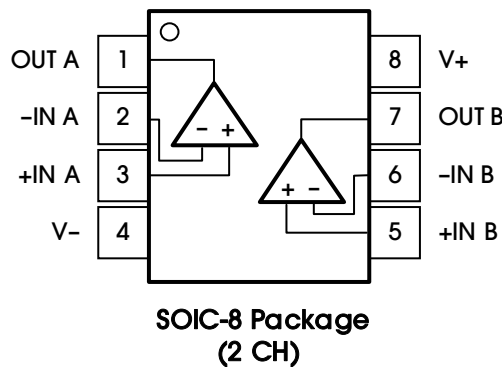


Figure 2. Pin Configuration (2 CH Devices)

Table 4 lists the pin functions (2 CH devices).

Table 4. Pin Functions (2 CH Devices)

POSITION	NAME	TYPE	DESCRIPTION
1	OUT A	Output	Output, channel A
2	-IN A	Input	Inverting input, channel A
3	+IN A	Input	Non-inverting input, channel A
4	V-	Power	Negative (lowest) power supply
5	+IN B	Input	Non-inverting input, channel B
6	-IN B	Input	Inverting input, channel B
7	OUT B	Output	Output, channel B
8	V+	Power	Positive (highest) power supply

5. SPECIFICATIONS

5.1 ABSOLUTE MAXIMUM RATINGS

Table 5 lists the absolute maximum ratings of the OPZ302/3022.

Table 5. Absolute Maximum Ratings

PARAMETER	DESCRIPTION		MIN	MAX	UNITS
Voltage	Supply	Split	±2.25	±20	V
		Single	4.5	40	
	Signal input pins ⁽²⁾	Common-mode	(V-) - 0.5	(V+) + 0.5	
		Differential		±6	
Current	Signal input pins			±10	mA
	Output short-circuit ⁽³⁾	Continuous			
Temperature	Operating, T _A ⁽⁴⁾		-40	125	°C
	Junction, T _J			150	
	Storage, T _{stg}		-65	150	

Note 1: Stresses beyond those listed under Table 5 may cause permanent damage to the device. These are stress ratings only, which do not imply functional operation of the device at these or any other conditions beyond those indicated under Table 7. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

Note 2: Input terminals are diode-clamped to the power-supply rails. Input signals that can swing more than 0.5V beyond the supply rails should be current-limited to 10mA or less.

Note 3: Short-circuit to ground, V-, or V+.

Note 4: Provided device does not exceed maximum junction temperature (T_J) at any time.

5.2 ESD RATINGS

Table 6 lists the ESD ratings of the OPZ302/3022.

Table 6. ESD Ratings

PARAMETER	SYMBOL	DESCRIPTION	VALUE	UNITS
Electrostatic Discharge	V _(ESD)	Human-body model (HBM), per ANSI/ESDA/JEDEC JS-001 ⁽¹⁾	±2000	V
		Charged-device model (CDM), per JEDEC specification JESD22-C101 ⁽²⁾	±1500	

Note 1: The JEDEC document JEP155 indicates that 500V HBM allows safe manufacturing with a standard ESD control process.

Note 2: The JEDEC document JEP157 indicates that 250V CDM allows safe manufacturing with a standard ESD control process.

5.3 RECOMMENDED OPERATING CONDITIONS

Table 7 lists the recommended operating conditions for the OPZ302/3022.

Table 7. Recommended Operating Conditions

PARAMETER	DESCRIPTION	MIN	NOM	MAX	UNITS
Operating Voltage Range	Split supply	±2.25		±20	V
	Single supply	4.5		40	V
Specified Temperature Range		-40		125	°C

5.4 THERMAL INFORMATION

Table 8 lists the thermal information for the OPZ302/3022.

Table 8. Thermal Information

PARAMETER	SYMBOL	SOT23-5	SOIC-8	UNITS
Junction-to-Ambient Thermal Resistance	$R_{\theta JA}$	168	90.6	°C/W
Junction-to-Board Thermal Resistance	$R_{\theta JB}$	39	47.6	°C/W
Junction-to-Top Characterization Parameter	ψ_{JT}	10	3.6	°C/W
Junction-to-Board Characterization Parameter	ψ_{JB}	36	47	°C/W
Junction-to-Case (Top) Thermal Resistance	$R_{\theta JC(top)}$	103	35	°C/W
Junction-to-Case (Bottom) Thermal Resistance	$R_{\theta JC(bot)}$	66	50.8	°C/W

5.5 ELECTRICAL CHARACTERISTICS

Table 9 lists the electrical characteristics of the OPZ302/3022. $T_A = 25^\circ\text{C}$, $V_S = \pm 4\text{V}$ to $\pm 20\text{V}$ ($V_S = 8\text{V}$ to 40V), $R_L = 10\text{k}\Omega$ connected to $V_S / 2$, and $V_{CM} = V_{OUT} = V_S / 2$, unless otherwise noted.

Table 9. Electrical Characteristics

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
OFFSET VOLTAGE						
Input Offset Voltage	V_{OS}			± 2.5	± 10	μV
		$T_A = -40^\circ\text{C}$ to 125°C		± 0.03	± 0.085	$\mu\text{V}/^\circ\text{C}$
Power-Supply Rejection Ratio	PSRR	$V_S = 4.5\text{V}$ to 40V , $T_A = -40^\circ\text{C}$ to 125°C		± 0.07	± 0.3	$\mu\text{V}/\text{V}$
Long-Term Stability ⁽²⁾				4		μV
INPUT BIAS CURRENT						
Input Bias Current	I_B	$V_{CM} = V_S / 2$		± 226	± 1000	pA
		$T_A = -40^\circ\text{C}$ to 125°C			± 10	nA
Input Offset Current	I_{OS}			± 575	± 2500	pA
		$T_A = -40^\circ\text{C}$ to 125°C			± 5	nA
NOISE						
Input Voltage Noise	e_n	$f = 0.1\text{Hz}$ to 10Hz		260		nV_{P-P}
		$f = 0.1\text{Hz}$ to 10Hz		39		nV_{rms}
Input Voltage Noise Density		$f = 1\text{kHz}$		11.6		$\text{nV}/\sqrt{\text{Hz}}$
Input Current Noise Density	i_n	$f = 1\text{kHz}$		354		$\text{fA}/\sqrt{\text{Hz}}$
INPUT VOLTAGE RANGE						
Common-Mode Voltage Range	V_{CM}	$T_A = -40^\circ\text{C}$ to 125°C	V_-		$(V_+) - 1.5$	V
Common-Mode Rejection Ratio	CMRR	$(V_-) < V_{CM} < (V_+) - 1.5\text{V}$	135	148		dB
		$(V_-) + 0.5\text{V} < V_{CM} < (V_+) - 1.5\text{V}$, $V_S = \pm 20\text{V}$	136	147		dB
		$(V_-) + 0.5\text{V} < V_{CM} < (V_+) - 1.5\text{V}$, $V_S = \pm 20\text{V}$, $T_A = -40^\circ\text{C}$ to 125°C	132			dB
INPUT IMPEDANCE						
Differential	Z_{ID}			$100 \parallel 6$		$\text{M}\Omega \parallel \text{pF}$
Common-Mode	Z_{IC}			$6 \parallel 9.5$		$10^{12}\Omega \parallel \text{pF}$
OPEN-LOOP GAIN						
Open-Loop Voltage Gain	A_{OL}	$(V_-) + 0.5\text{V} < V_O < (V_+) - 0.5\text{V}$	138	154		dB
		$(V_-) + 0.5\text{V} < V_O < (V_+) - 0.5\text{V}$, $T_A = -40^\circ\text{C}$ to 125°C	130			dB
FREQUENCY RESPONSE						
Gain-Bandwidth Product	GBW			2.2		MHz
Slew Rate	SR	$G = 1$		3.8		$\text{V}/\mu\text{s}$
Settling Time	0.1%	t_s	$V_S = \pm 20\text{V}$, $G = 1$, 10V step	6.8		μs
	0.01%		$V_S = \pm 20\text{V}$, $G = 1$, 10V step	25		μs
Overload Recovery Time	t_{OR}	$V_{IN} \times G = V_S$		1		μs

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
OUTPUT						
Voltage Output Swing from Rail		No load		2	15	mV
		$R_L = 10k\Omega$		90	200	mV
		$T_A = -40^\circ\text{C to } 125^\circ\text{C}$			260	mV
Short-Circuit Current	I_{SC}	Sinking		-20		mA
		Sourcing		29		mA
Open-Loop Output Resistance	R_O	$f = 1\text{MHz}, I_O = 0$		120		Ω
Capacitive Load Drive	C_{LOAD}			2		nF
POWER SUPPLY						
Quiescent Current per Amplifier	I_Q	$V_S = \pm 4.5\text{V to } \pm 20\text{V}$		600	720	μA
		$I_O = 0\text{mA}, T_A = -40^\circ\text{C to } 125^\circ\text{C}$			750	μA

Note 1: $V_S / 2 = \text{mid-supply}$.

Note 2: 1000-hour life test at 125°C demonstrated randomly distributed variation in the range of measurement limits—approximately $4\mu\text{V}$.

6. TYPICAL CHARACTERISTICS

$V_S = \pm 18V$, $V_{CM} = V_S / 2$, $R_{LOAD} = 10k\Omega$ connected to $V_S / 2$, and $C_L = 100pF$, unless otherwise noted.

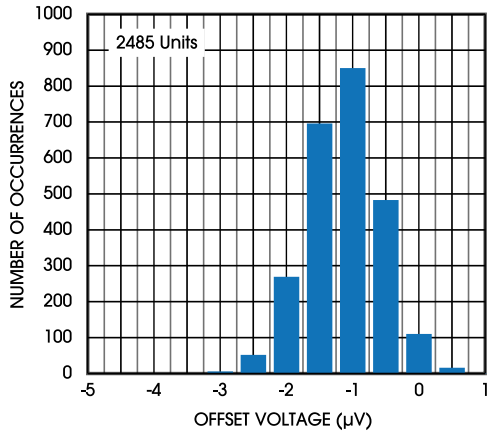


Figure 3. Offset Voltage Production Distribution

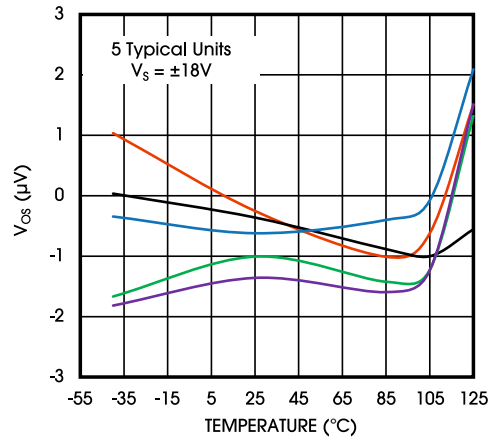


Figure 4. Offset Voltage vs. Temperature

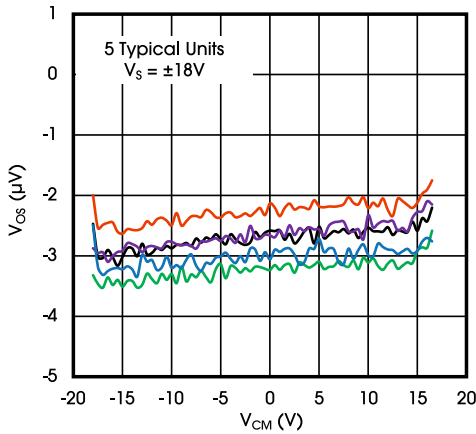


Figure 5. Offset Voltage vs. Common-Mode Voltage ($\pm 18V$)

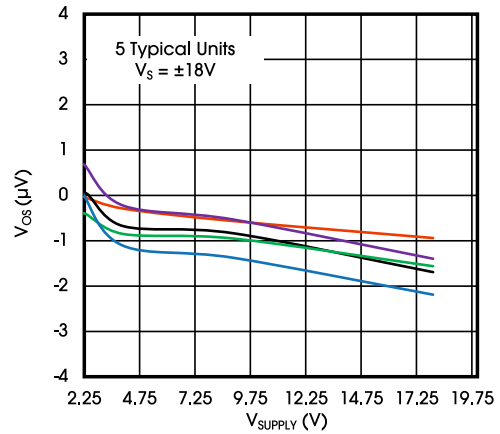


Figure 6. Offset Voltage vs. Power Supply

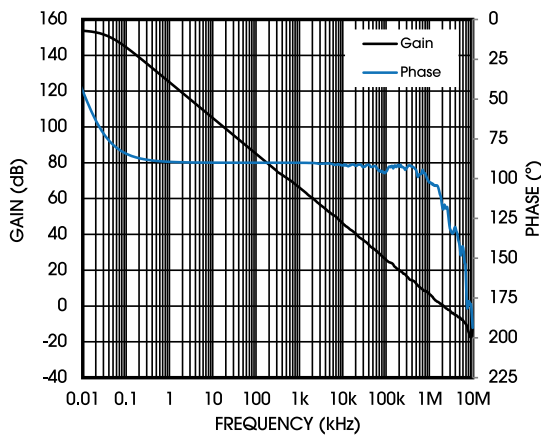


Figure 7. Open-Loop Gain and Phase vs. Frequency

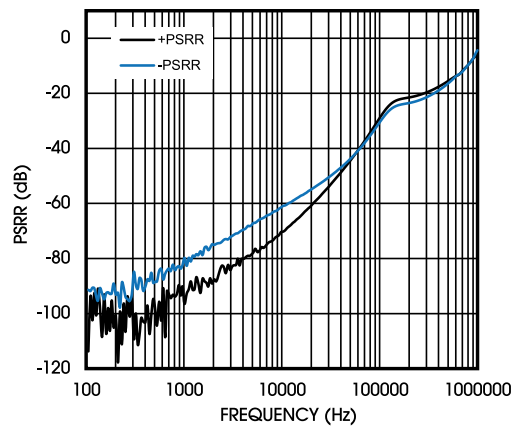


Figure 8. PSRR vs. Frequency (Referred-to-Input)

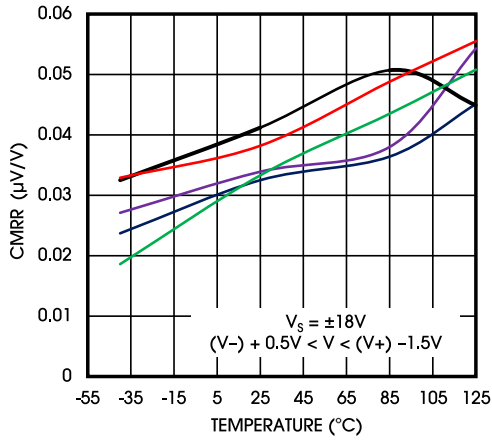


Figure 9. CMRR vs. Temperature

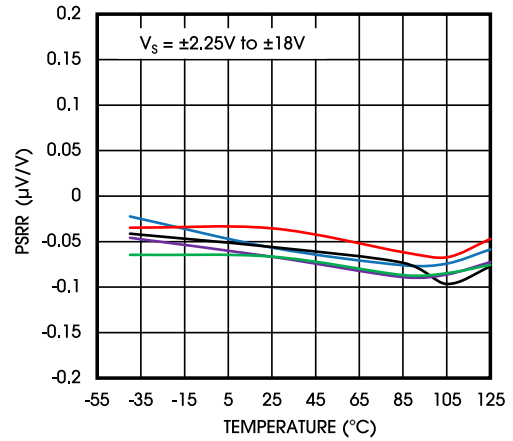


Figure 10. PSRR vs. Temperature

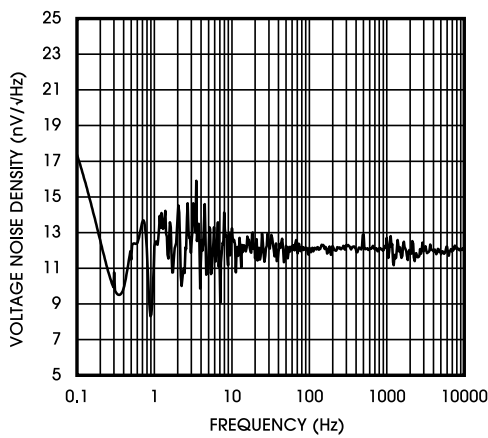


Figure 11. Input Voltage Noise Spectral Density vs. Frequency

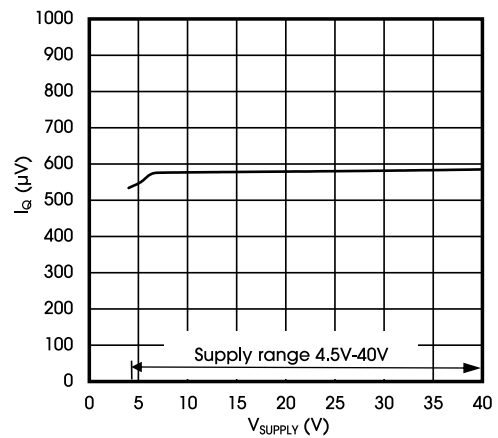


Figure 12. Quiescent Current vs. Supply Voltage

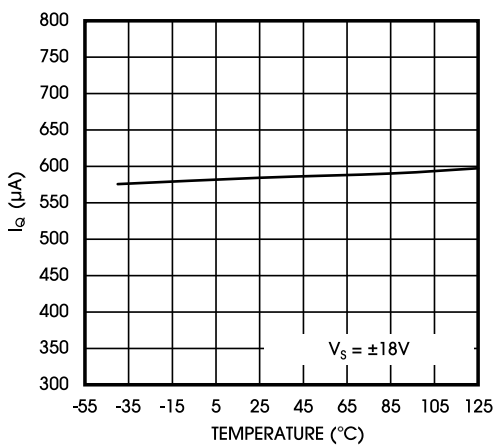


Figure 13. Quiescent Current vs. Temperature

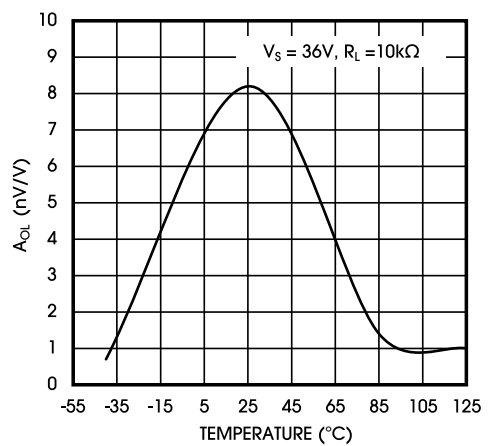


Figure 14. Open-Loop Gain vs. Temperature

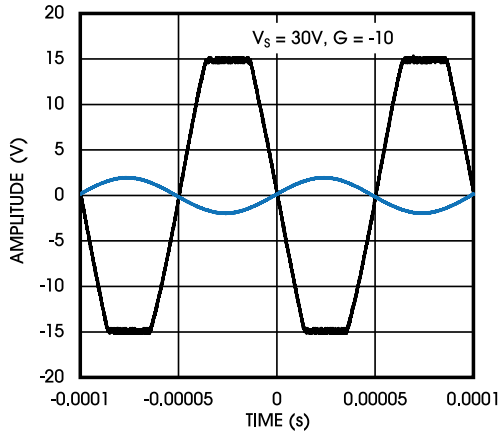


Figure 15. No Phase Reversal

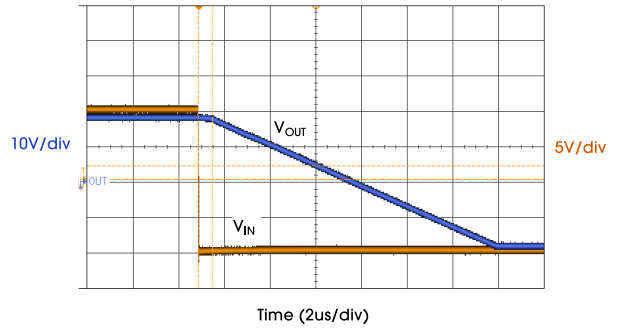


Figure 16. Positive Overload Recovery

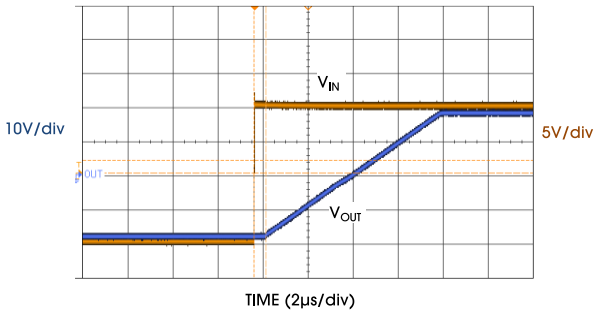


Figure 17. Negative Overload Recovery

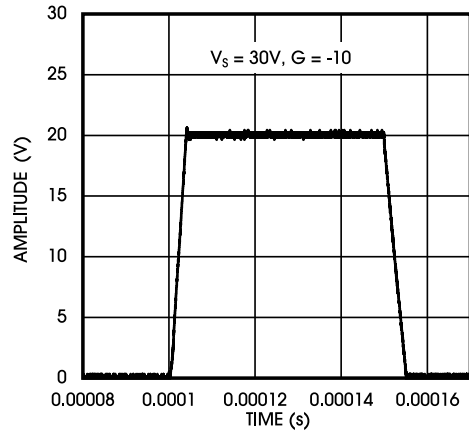


Figure 18. Large-Signal Step Response

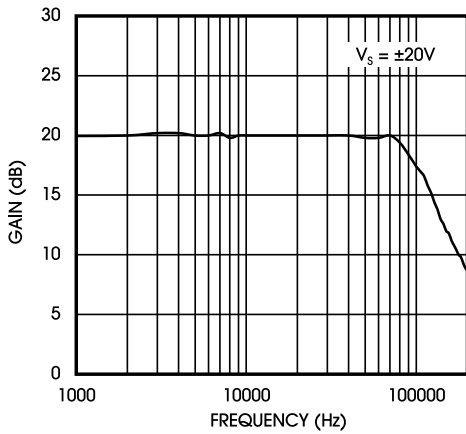


Figure 19. Maximum Output Voltage vs. Frequency

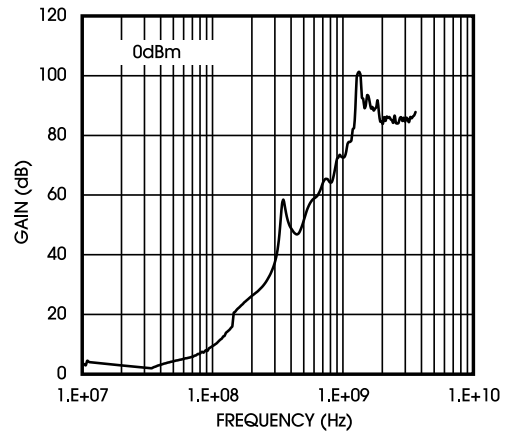


Figure 20. EMIRR IN+ vs. Frequency

7. 详细说明

7.1 概述

OPZ302/3022 器件是高性能、零漂移运算放大器，支持 4.5V-40V 电源范围。凭借最大 $10\mu\text{V}$ 、 $0.085\mu\text{V}/^\circ\text{C}$ 的极低输入失调电压和出色的高 CMRR、PSRR 和 A_{OL} ，OPZ302/3022 器件可提供出色的初始精度和轨到轨输出。这些器件还提供高达 2.2MHz 的带宽和 $3.8\text{V}/\mu\text{s}$ 的转换率。OPZ302/3022 器件属于零漂移、低功耗运算放大器系列。他们的架构还可以提供出色的交流性能，如超低宽带噪声和零闪烁噪声。

7.2 功能模块框图

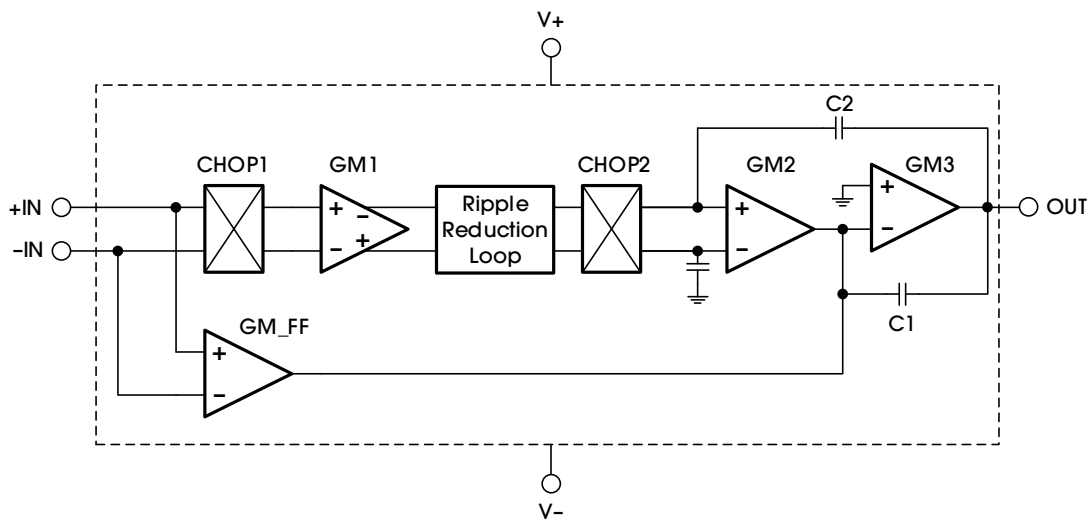


Figure 21. Functional Block Diagram

7.3 特性描述

OPZ302/3022 器件单位增益稳定，并使用自动校准技术提供低失调电压以及随时间和温度变化的极低漂移。为了获得更好的精度性能，建议在设计中避免温度梯度、异种金属和直接气流。

7.3.1 操作特性

OPZ302/3022 器件的额定工作电压范围为 4.5V 至 40V ($\pm 2.25V$ 至 $\pm 20V$)。许多规格适用于 -40°C 至 125°C 。TYPICAL CHARACTERISTICS 中列出了在工作电压或温度方面可能表现出显著变化的参数。

7.3.2 反相保护

当输入被驱动超出线性共模范围时，许多运算放大器会出现相位反转。当输入被驱动超出指定的共模电压范围时，这种情况在同相电路中最常遇到，导致输出反向进入相反的电源轨。OPZ302/3022 输入可防止共模电压过高导致反相。

7.3.3 输入偏置电流时钟馈通

OPZ302/3022 器件使用输入开关来校正放大器的固有失调和漂移。输入端的开关会在输入偏置电流中引入短瞬态，该电流可能会耦合到放大器的输出端。发现问题后，建议在功放输出端加 RC 低功耗滤波器。

7.3.4 内部失调校正

OPZ302/3022 运算放大器使用自动校准技术来获得低失调。上电后，自动校准电路工作以达到指定的 V_{OS} 精度。此设计没有混叠或闪烁噪声。

7.3.5 容性负载和稳定性

器件动态特性针对一系列常见操作条件进行了优化。低闭环增益和高容性负载的结合会降低放大器的相位裕度，并可能导致增益峰值或振荡。因此，较大的容性负载必须与输出隔离。实现这种隔离的最简单方法是在输出端串联一个小电阻 (例如， R_{out} 等于 50Ω)。

7.3.6 电气过载

OPZ302/3022 器件设计用于承受高电气过载和意外 ESD 事件。通常，器件的输入引脚对设计人员来说是最具挑战性的。OPZ302/3022 器件增强了过压和 ESD 侧的保护。但是，为避免过载故障或 ESD 事件，请让 OPZ302/3022 在规格范围内工作。

7.4 器件功能模式

OPZ302/3022 具有单一功能模式，在电源电压大于 4.5V ($\pm 2.25V$) 时工作。OPZ302/3022 的最大电源电压为 40V ($\pm 20V$)。

8. 应用和实现

注

以下应用部分中的信息不是 Analogyssemi 组件规范的一部分, Analogyssemi 不保证其准确性或完整性。Analogyssemi 的客户有责任确定组件是否适合他们的用途。客户应验证和测试他们的设计实施以确认系统功能。

8.1 应用信息

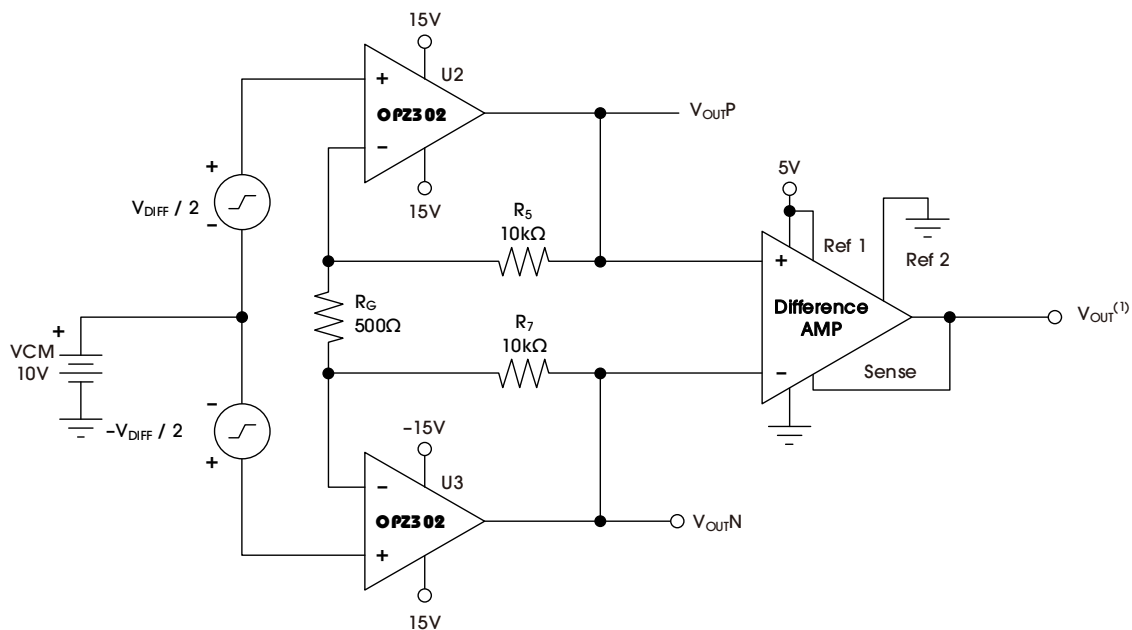
OPZ302/3022 运算放大器将精密偏移和漂移与出色的整体性能相结合, 使该器件成为许多精密应用的绝佳选择。仅 $0.085\mu\text{V}/^\circ\text{C}$ 的精密失调漂移可在整个温度范围内提供稳定性。此外, 该器件还将出色的 CMRR、PSRR 和 A_{OL} 直流性能与出色的低噪声运行相结合。与所有放大器一样, 具有噪声或高阻抗电源的应用需要靠近器件引脚的去耦电容器。在大多数情况下, $0.1\mu\text{F}$ 的电容器就足够了。

以下应用示例仅重点介绍了可使用 OPZ302/3022 的部分电路。

8.2 典型应用

8.2.1 使用 3.3V 电源的 ADC 的离散 INA+衰减

Figure 22 显示了如何将 OPZ302/3022 用作具有衰减功能的精密分立仪表放大器的高电压、高阻抗前端的示例。差分放大器提供衰减功能, 使该电路能够轻松连接 3.3V 或 5V 模数转换器(ADC)。



$$(1) V_{OUT} = V_{DIFF} \times (41 / 5) + (Ref 1) / 2.$$

Figure 22. Discrete INA + Attenuation for ADC With 3.3V Supply

8.2.2 桥式放大器

Figure 23 显示了桥式放大器的基本配置。

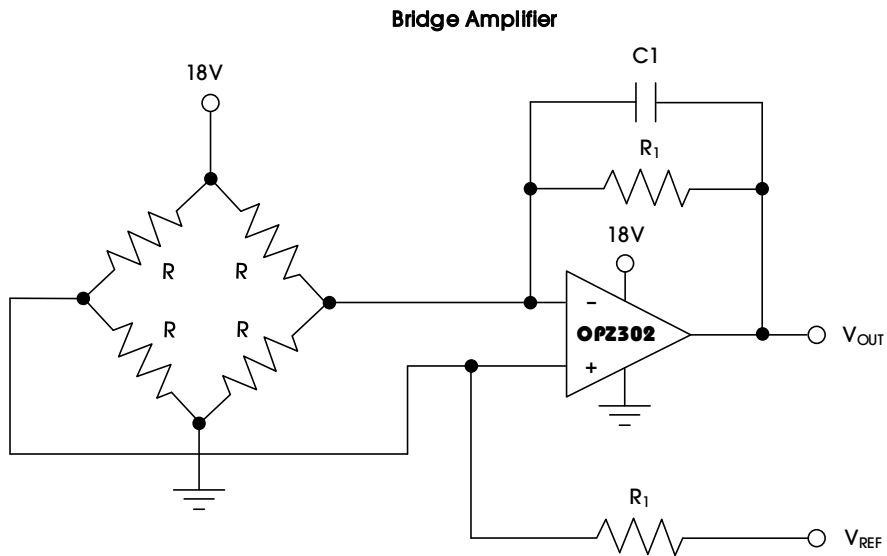


Figure 23. Bridge Amplifier

8.2.3 低端电流监控器

Figure 24 显示了在低侧电流检测应用中配置的 OPZ302/3022。负载电流(I_{LOAD}) 在分流电阻器(R_{SHUNT}) 上产生压降。该电压由 OPZ302/3022 放大, 增益为 201。负载电流设置为 0A 至 500mA, 对应于 0V 至 10V 的输出电压范围。可以通过改变配置的分流电阻或增益来调整输出范围。

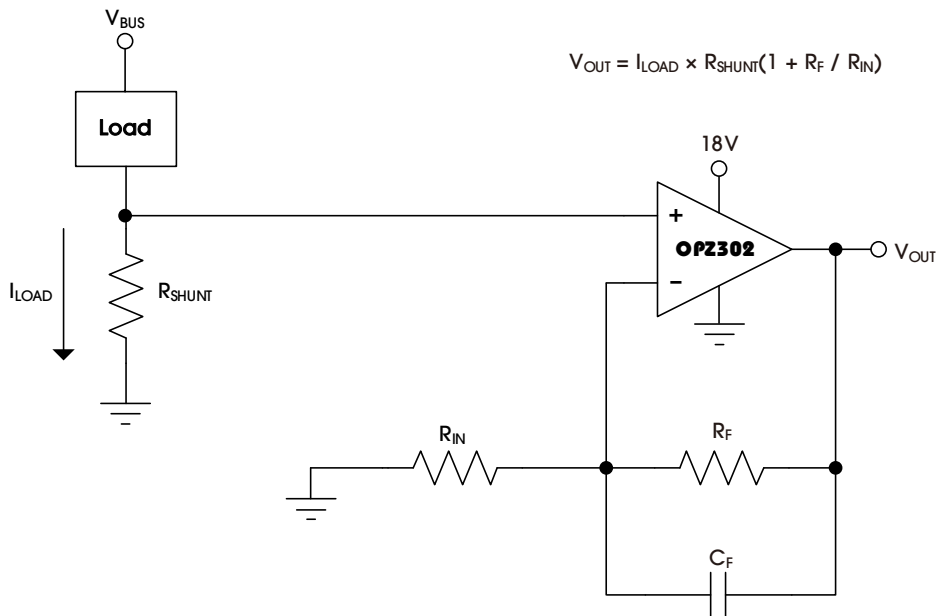
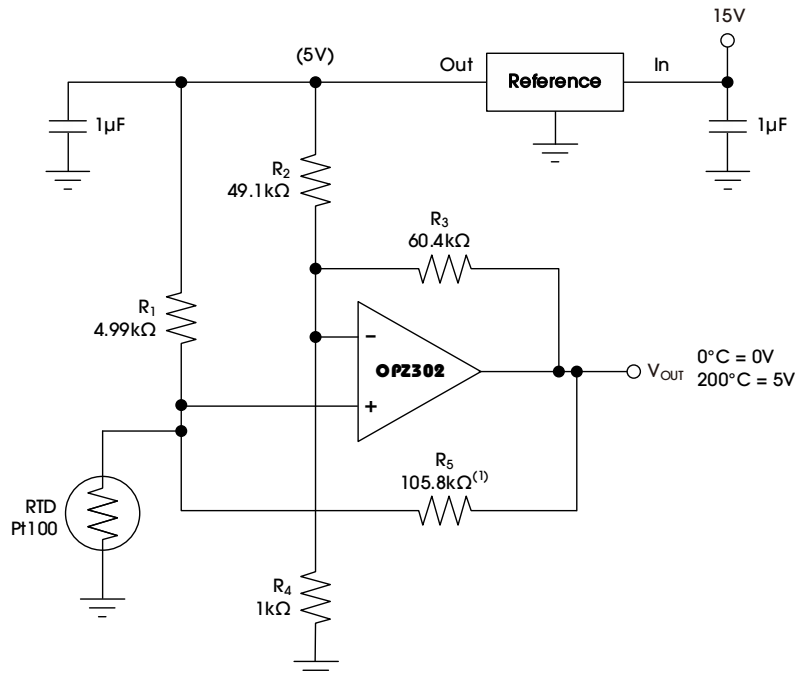


Figure 24. Low-Side Current Monitor

8.2.4 具有线性化功能的 RTD 放大器

有关 Figure 25 的深入分析，请参见电阻温度检测器的模拟线性化。



(1) R_5 provides positive-varying excitation to linearize output.

Figure 25. RTD Amplifier With Linearization

9. 电源供电推荐

OPZ302/3022 的额定工作电压为 4.5V 至 40V ($\pm 2.25V$ 至 $\pm 20V$)；许多规格适用于 -40°C 至 125°C 。TYPICAL CHARACTERISTICS 显示的参数可能会随工作电压或温度的变化而显著变化。

警告： 大于 40V 的电源电压会永久损坏设备(参见 ABSOLUTE MAXIMUM RATINGS)。

10. 布局

10.1 布局指南

为获得设备的最佳运行性能，请使用良好的印刷电路板(PCB)布局实践，包括：

- 在每个电源引脚和地之间连接低 ESR、 $0.1\mu\text{F}$ 陶瓷旁路电容器，并尽可能靠近器件放置。从 $V+$ 到地的单个旁路电容器适用于单电源应用。
- 为减少寄生耦合，输入走线应尽可能远离电源线。
- 使用接地层帮助散发热量并减少 EMI 噪声拾取。
- 将外部组件尽可能靠近设备放置。此配置可防止发生寄生错误(例如塞贝克效应)。
- 考虑在关键走线周围设置一个驱动的低阻抗保护环。保护环可以显著降低附近不同电位走线的漏电流。

10.2 布局示例

请参考 EVM 或者咨询 AnalogSemi 销售支持。

11. PACKAGE INFORMATION

The OPZ302/3022 devices are available in the SOT23-5 and SOIC-8 packages.

11.1 SOT23-5 PACKAGE

Figure 26 shows the SOT23-5 package view.

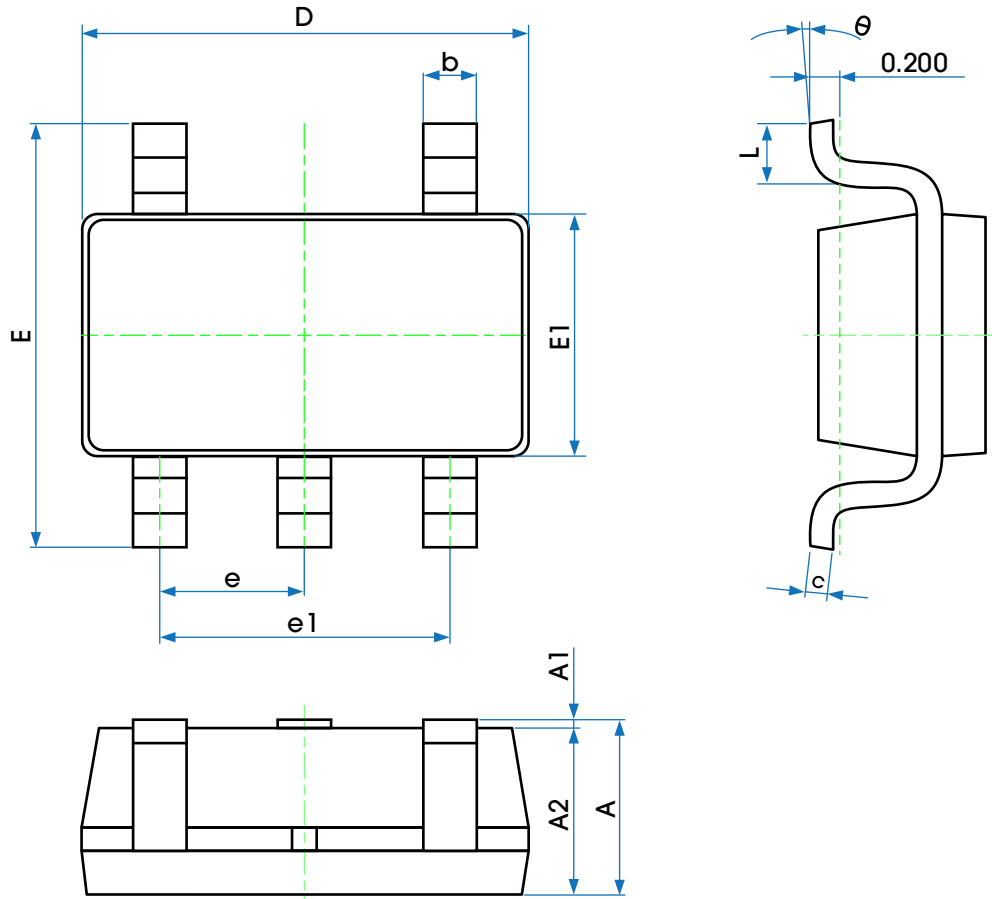


Figure 26. SOT23-5 Package View

Table 10 provides detailed information about the dimensions of the SOT23-5 package.

Table 10. Dimensions of the SOT23-5 Package

SYMBOL	DIMENSIONS IN MILLIMETERS		DIMENSIONS IN INCHES	
	MIN	MAX	MIN	MAX
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	2.650	2.950	0.104	0.116
E1	1.500	1.700	0.059	0.067
e	0.950 (BSC)		0.037 (BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

11.2 SOIC-8 PACKAGE

Figure 27 shows the SOIC-8 package view.

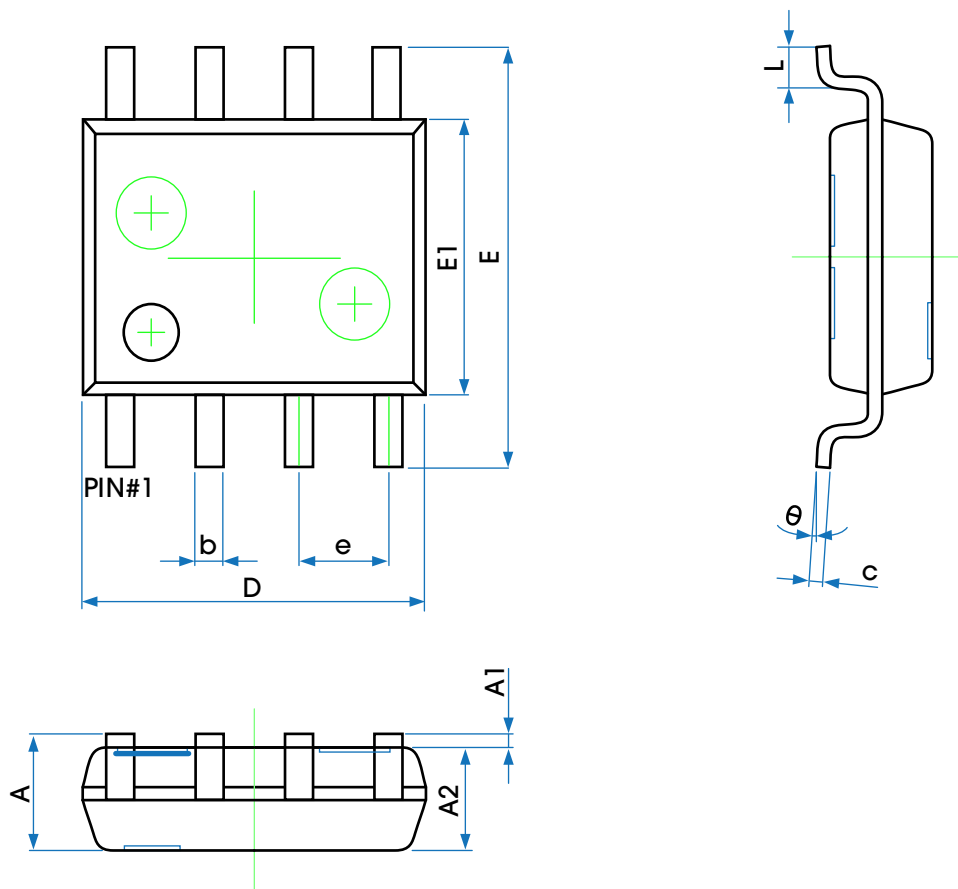


Figure 27. SOIC-8 Package View

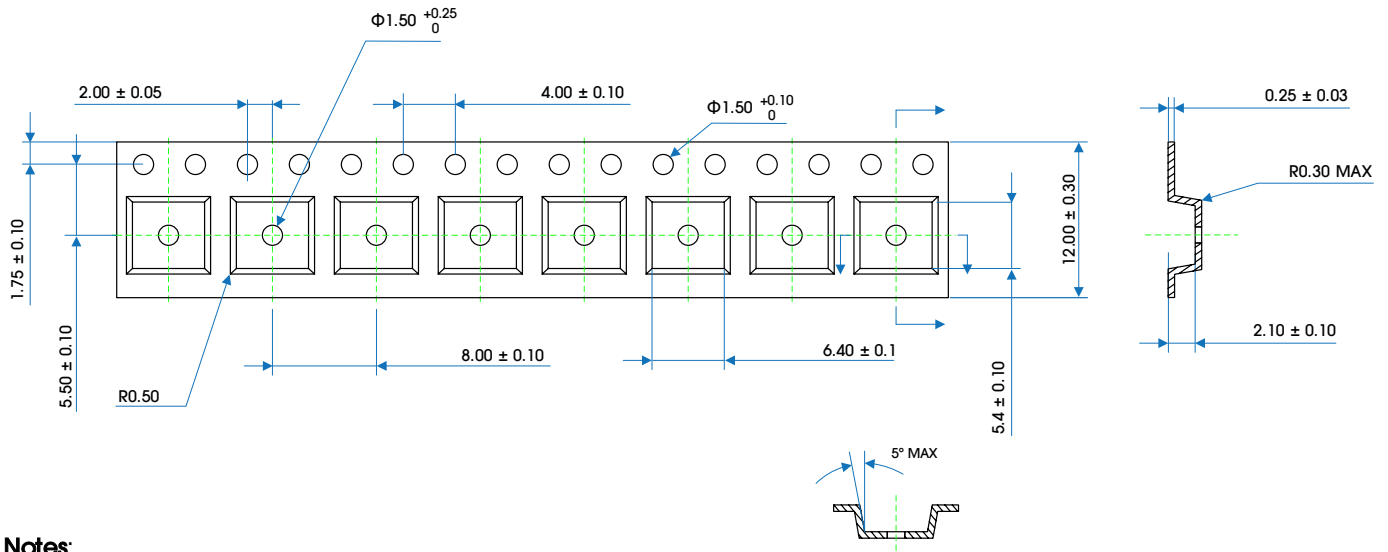
Table 11 provides detailed information about the dimensions of the SOIC-8 package.

Table 11. Dimensions of the SOIC-8 Package

SYMBOL	DIMENSIONS IN MILLIMETERS		DIMENSIONS IN INCHES	
	MIN	MAX	MIN	MAX
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.007	0.010
D	4.700	5.100	0.185	0.201
E	5.800	6.200	0.228	0.244
E1	3.800	4.000	0.150	0.157
e	1.270 (BSC)		0.050 (BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°

12.2 SOIC-8 PACKAGE

Figure 30 illustrates the carrier tape.



Notes:

1. Cover tape width: 9.5 ± 0.10.
2. Cumulative tolerance of 10 sprocket hole pitch: ±0.20 (max).
3. Camber: not to exceed 1mm in 100mm.
4. Mold#: SOIC-8.
5. All dimensions: mm.
6. Direction of view:

Figure 30. Carrier Tape Drawing

Table 13 provides information about tape and reel.

Table 13. Tape and Reel Information

PACKAGE TYPE	REEL	QTY/REEL	REEL/ INNER BOX	INNER BOX/ CARTON	QTY/CARTON	INNER BOX SIZE (MM)	CARTON SIZE (MM)
SOIC-8	13"	4000	1	8	32000	358*340*50	430*380*390

Figure 31 shows the product loading orientation—pin 1 is assigned at Q1.

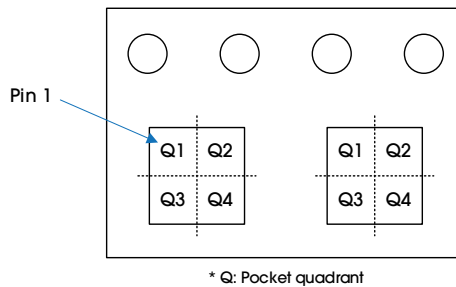


Figure 31. Product Loading Orientation

OPZ302/OPZ3022

40V, High-Performance, General-Purpose, Zero-Drift Operational Amplifiers

REVISION HISTORY

REVISION	DATE	DESCRIPTION
Rev A	09 February 2023	Rev A release.