

OPAx131 通用 FET 输入运算放大器

1 特性

- FET 输入： $I_B = 50\text{pA}$ (最大值)
- 低失调电压：最大 $750\text{ }\mu\text{V}$
- 宽电源电压范围： $\pm 4.5\text{V}$ 至 $\pm 18\text{V}$
- 压摆率： $10\text{V}/\mu\text{s}$
- 高带宽： 4MHz
- 出色的容性负载驱动
- 单通道、双通道、四通道版本

2 应用

- 数据采集 (DAQ)
- 流量变送器
- 实验室和现场仪表
- 心电图 (ECG)

3 说明

OPAx131 系列 FET 输入运算放大器以低成本提供高性能。OPA131 单通道、OPA2131 双通道和 OPA4131 四通道版本采用业界通用引脚排列，可提供具有成本效益的设计选项。

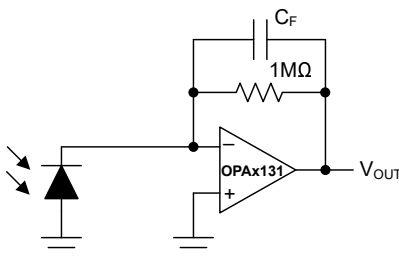
OPAx131 系列提供出色的通用性能，包括低失调电压、偏移和良好的动态特性。

单通道和双通道版本采用 8 引脚 SOIC 表面贴装封装。四通道版本采用 14 引脚和 16 引脚 SOIC 表面贴装封装以及 14 引脚 PDIP 封装。

器件信息

器件型号	通道数	封装 ⁽¹⁾
OPA131	单通道	D (SOIC, 8)
OPA2131	双通道	D (SOIC, 8)
OPA4131	四通道	D (SOIC, 14)
		DW (SOIC, 16)
		N (PDIP, 14)

(1) 有关更多信息，请参阅节 9。



简化版跨阻放大器



Table of Contents

1 特性	1	6 Application and Implementation	12
2 应用	1	6.1 Application Information.....	12
3 说明	1	6.2 Typical Application.....	12
4 Pin Configuration and Functions	3	7 Device and Documentation Support	13
5 Specifications	6	7.1 接收文档更新通知.....	13
5.1 Absolute Maximum Ratings.....	6	7.2 支持资源.....	13
5.2 Recommended Operating Conditions.....	6	7.3 Trademarks.....	13
5.3 Thermal Information - OPA131.....	7	7.4 静电放电警告.....	13
5.4 Thermal Information - OPA2131.....	7	7.5 术语表.....	13
5.5 Thermal Information - OPA4131.....	7	8 Revision History	13
5.6 Electrical Characteristics.....	8	9 Mechanical, Packaging, and Orderable Information..	14
5.7 Typical Characteristics.....	9		

4 Pin Configuration and Functions

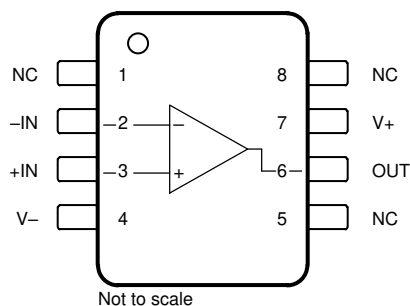


图 4-1. OPA131 D Package, 8-Pin SOIC (Top View)

表 4-1. Pin Functions: OPA131

PIN		TYPE	DESCRIPTION
NAME	NO.		
+IN	3	Input	Noninverting input, channel A
- IN	2	Input	Inverting input, channel A
NC	1, 5	—	Do not connect these pins ⁽¹⁾
NC	8	—	No internal connection. Float this pin.
OUT	6	Output	Output
V+	7	Power	Positive (highest) power supply
V -	4	Power	Negative (lowest) power supply

(1) Existing layouts for the OPA131 D package before revision B of this data sheet do not need to be redesigned.

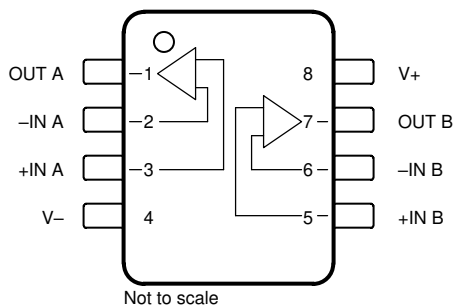


图 4-2. OPA2131 D Package, 8-Pin SOIC (Top View)

表 4-2. Pin Functions: OPA2131

PIN		TYPE	DESCRIPTION
NAME	NO.		
+IN A	3	Input	Noninverting input, channel A
+IN B	5	Input	Noninverting input, channel B
- IN A	2	Input	Inverting input, channel A
- IN B	6	Input	Inverting input, channel B
OUT A	1	Output	Output, channel A
OUT B	7	Output	Output, channel B
V+	8	Power	Positive (highest) power supply
V -	4	Power	Negative (lowest) power supply

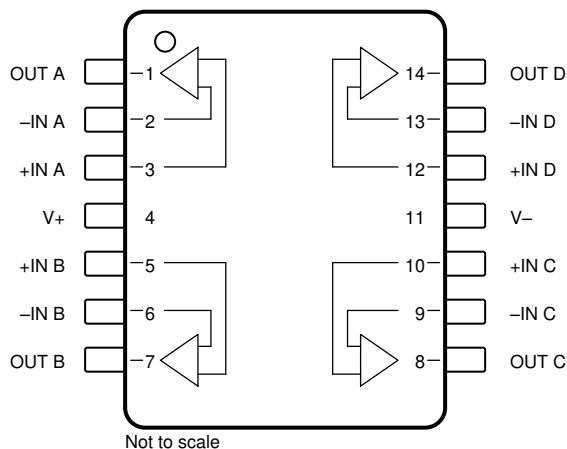


图 4-3. OPA4131 D Package, 14-Pin SOIC, and N Package, 14-Pin PDIP (Top View)

表 4-3. Pin Functions: OPA4131 D and N packages

PIN		TYPE	DESCRIPTION
NAME	NO.		
+IN A	3	Input	Noninverting input, channel A
+IN B	5	Input	Noninverting input, channel B
+IN C	10	Input	Noninverting input, channel C
+IN D	12	Input	Noninverting input, channel D
- IN A	2	Input	Inverting input, channel A
- IN B	6	Input	Inverting input, channel B
- IN C	9	Input	Inverting input, channel C
- IN D	13	Input	Inverting input, channel D
OUT A	1	Output	Output, channel A
OUT B	7	Output	Output, channel B
OUT C	8	Output	Output, channel C
OUT D	14	Output	Output, channel D
V+	4	Power	Positive (highest) power supply
V -	11	Power	Negative (lowest) power supply

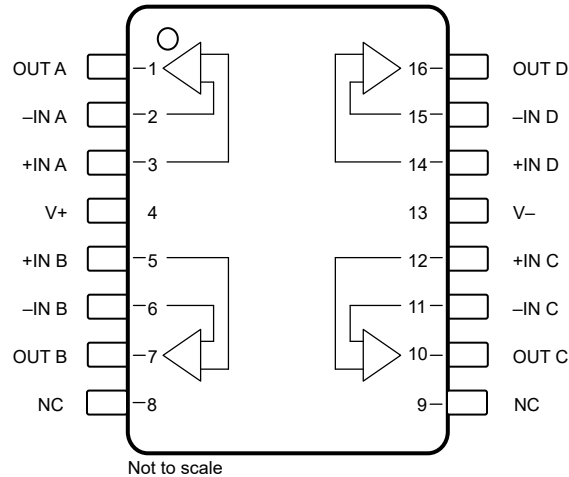


图 4-4. OPA4131 DW Package, 16-Pin SOIC (Top View)

表 4-4. Pin Functions: OPA4131 DW Package

PIN		TYPE	DESCRIPTION
NAME	NO.		
+IN A	3	Input	Noninverting input, channel A
+IN B	5	Input	Noninverting input, channel B
+IN C	12	Input	Noninverting input, channel C
+IN D	14	Input	Noninverting input, channel D
- IN A	2	Input	Inverting input, channel A
- IN B	6	Input	Inverting input, channel B
- IN C	11	Input	Inverting input, channel C
- IN D	15	Input	Inverting input, channel D
OUT A	1	Output	Output, channel A
OUT B	7	Output	Output, channel B
OUT C	10	Output	Output, channel C
OUT D	16	Output	Output, channel D
V+	4	Power	Positive (highest) power supply
V -	13	Power	Negative (lowest) power supply
NC	8, 9	—	No internal connection. Float this pin.

5 Specifications

5.1 Absolute Maximum Ratings

over operating free-air temperature range (unless otherwise noted)⁽¹⁾

			MIN	MAX	UNIT
V _S	Supply voltage, (V ⁺) – (V [–])	Dual supply		±18	V
		Single supply		36	
	Input voltage ⁽²⁾		(V [–]) – 0.5	(V ⁺) + 0.5	V
	Input current ⁽²⁾			±10	mA
I _{SC}	Output short-circuit ⁽³⁾		Continuous		
T _A	Operating temperature		– 55	125	°C
T _J	Junction temperature			150	°C
T _{stg}	Storage temperature		– 55	125	°C

- (1) Operation outside the *Absolute Maximum Ratings* may cause permanent device damage. *Absolute Maximum Ratings* do not imply functional operation of the device at these or any other conditions beyond those listed under *Recommended Operating Conditions*. If used outside the *Recommended Operating Conditions* but within the *Absolute Maximum Ratings*, the device may not be fully functional, and this may affect device reliability, functionality, performance, and shorten the device lifetime.
- (2) Input pins are diode-clamped to the power-supply rails. Input signals that can swing more than 0.5V beyond the supply rails must be current limited to 10mA or less.
- (3) Short-circuit to ground, one amplifier per package.

5.2 Recommended Operating Conditions

over operating free-air temperature range (unless otherwise noted)

			MIN	NOM	MAX	UNIT
V _S	Supply voltage, (V ⁺) – (V [–])	Dual supply	±4.5	±15	±18	V
		Single supply	9	30	36	
T _A	Ambient temperature		– 40		+85	°C

5.3 Thermal Information - OPA131

THERMAL METRIC ⁽¹⁾		OPA131	UNIT
		D (SOIC)	
		8 PINS	
$R_{\theta JA}$	Junction-to-ambient thermal resistance	150	°C/W
$R_{\theta JC(top)}$	Junction-to-case (top) thermal resistance	74	°C/W
$R_{\theta JB}$	Junction-to-board thermal resistance	62	°C/W
Ψ_{JT}	Junction-to-top characterization parameter	19.7	°C/W
Ψ_{JB}	Junction-to-board characterization parameter	54.8	°C/W
$R_{\theta JC(bot)}$	Junction-to-case (bottom) thermal resistance	N/A	°C/W

(1) For more information about traditional and new thermal metrics, see the [Semiconductor and IC Package Thermal Metrics](#) application report.

5.4 Thermal Information - OPA2131

THERMAL METRIC ⁽¹⁾		OPA2131	UNIT
		D (SOIC)	
		8 PINS	
$R_{\theta JA}$	Junction-to-ambient thermal resistance	150	°C/W
$R_{\theta JC(top)}$	Junction-to-case (top) thermal resistance	52.3	°C/W
$R_{\theta JB}$	Junction-to-board thermal resistance	63.5	°C/W
Ψ_{JT}	Junction-to-top characterization parameter	10.7	°C/W
Ψ_{JB}	Junction-to-board characterization parameter	62.4	°C/W
$R_{\theta JC(bot)}$	Junction-to-case (bottom) thermal resistance	N/A	°C/W

(1) For more information about traditional and new thermal metrics, see the [Semiconductor and IC Package Thermal Metrics](#) application report.

5.5 Thermal Information - OPA4131

THERMAL METRIC ⁽¹⁾		OPA4131			UNIT
		D (SOIC)	DW (SOIC)	N (PDIP)	
		14 PINS	16 PINS	14 PINS	
$R_{\theta JA}$	Junction-to-ambient thermal resistance	110	110	80	°C/W
$R_{\theta JC(top)}$	Junction-to-case (top) thermal resistance	56	N/A	N/A	°C/W
$R_{\theta JB}$	Junction-to-board thermal resistance	53	N/A	N/A	°C/W
Ψ_{JT}	Junction-to-top characterization parameter	19	N/A	N/A	°C/W
Ψ_{JB}	Junction-to-board characterization parameter	46	N/A	N/A	°C/W
$R_{\theta JC(bot)}$	Junction-to-case (bottom) thermal resistance	N/A	N/A	N/A	°C/W

(1) For more information about traditional and new thermal metrics, see the [Semiconductor and IC Package Thermal Metrics](#) application report.

5.6 Electrical Characteristics

at $T_A = 25^\circ\text{C}$, $V_S = \pm 15\text{V}$, $R_L = 10\text{k}\Omega$ connected to midsupply, and $V_{CM} = V_{OUT} = \text{midsupply}$ (unless otherwise noted)

PARAMETER		TEST CONDITIONS		MIN	TYP	MAX	UNIT
OFFSET VOLTAGE							
V _{OS}	Input offset voltage	OPAx131UA			±0.2	±1	mV
		OPA2131U, OPA4131U			±0.2	±1.5	
		OPA131U			±0.2	±0.75	
dV _{OS} /dT	Input offset voltage drift	T _A = - 40°C to +85°C			±2	±10	μ V/°C
PSRR	Power-supply rejection ratio	9V ≤ V _S ≤ 36V	OPAx131UA, OPA2131U, OPA4131U		±50	±200	μ V/V
			OPA131U		±50	±100	
INPUT BIAS CURRENT							
I _B	Input bias current ⁽¹⁾				±5	±50	pA
		T _A = - 40°C to +85°C		See Typical Characteristics			
I _{OS}	Input offset current ⁽¹⁾				±1	±50	pA
NOISE							
e _n	Input voltage noise density	f = 10Hz			21		nV/ √ Hz
		f = 100Hz			16		
		f = 1kHz			15		
		f = 10kHz			15		
I _n	Input current noise density	f = 1kHz			3		fA/ √ Hz
INPUT VOLTAGE							
V _{CM}	Common-mode voltage			(V -) + 3		(V+) - 3.5	V
CMRR	Common-mode rejection ratio	- 12V ≤ V _{CM} ≤ 11.5V	OPAx131UA, OPA2131U, OPA4131U	70	80		dB
			OPA131U	80	86		
INPUT IMPEDANCE							
	Differential				10 ¹⁰ 5		Ω pF
	Common-mode	- 13V ≤ V _{CM} ≤ 11.5V			10 ¹² 4.3		
OPEN-LOOP GAIN							
A _{OL}	Open-loop voltage gain	- 12V ≤ V _O ≤ 12V	OPAx131UA, OPA2131U, OPA4131U	94	110		dB
			OPA131U	100	110		
FREQUENCY RESPONSE							
GBW	Gain bandwidth product				4		MHz
SR	Slew rate				10		V/ μ s
	Settling time	10V step, G = 1	0.1%		1.5		μ s
			0.01%		2		
THD+N	Total harmonic distortion plus noise	f = 1kHz, G = 1, V _O = 3.5V _{rms}			0.0008%		
OUTPUT							
V _O	Voltage output	R _L = 2k Ω	Positive	(V+) - 3	(V+) - 2.5		V
			Negative	(V -) + 2.5	(V -) + 3		
I _{SC}	Short-circuit current				±20		mA
POWER SUPPLY							
I _Q	Quiescent current (per amplifier)	I _O = 0mA	OPAx131UA		±1.5	±1.75	mA
			OPA131U		±1.5	±2	

(1) High-speed test at $T_J = 25^\circ\text{C}$.

5.7 Typical Characteristics

at $T_A = 25^\circ\text{C}$, $V_S = \pm 15\text{V}$, $R_L = 10\text{k}\Omega$ connected to midsupply, and $V_{CM} = V_{OUT} = \text{midsupply}$ (unless otherwise noted)

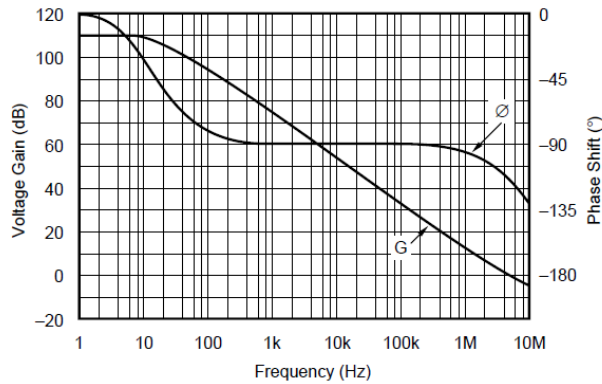


图 5-1. Open-Loop Gain and Phase vs Frequency

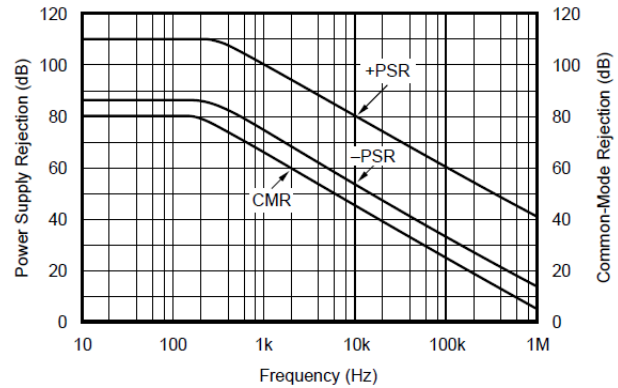


图 5-2. Power Supply and Common-Mode Rejection vs Frequency

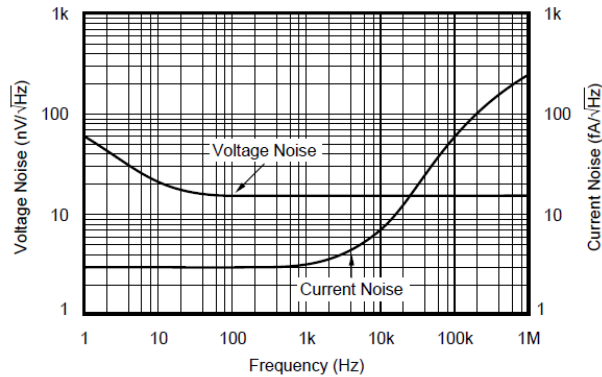


图 5-3. Input Voltage and Current Noise Spectral Density vs Frequency

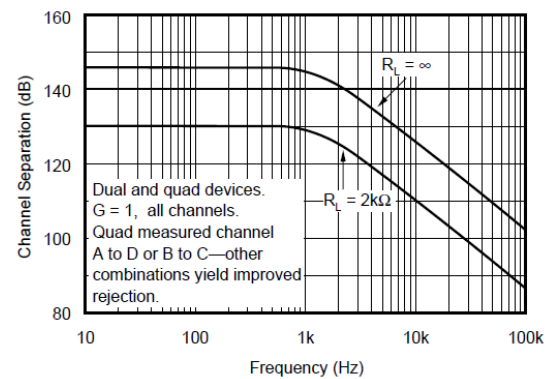


图 5-4. Channel Separation vs Frequency

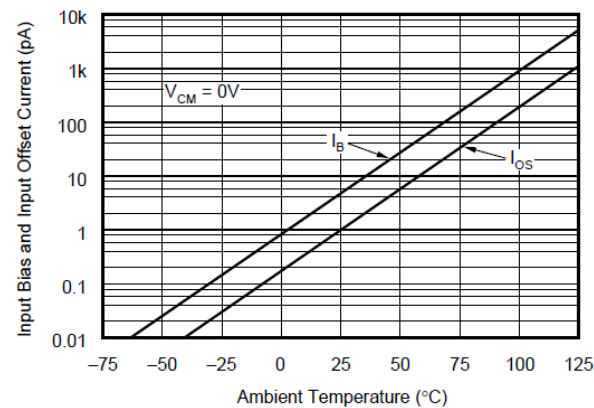


图 5-5. Input Bias and Input Offset Current vs Temperature

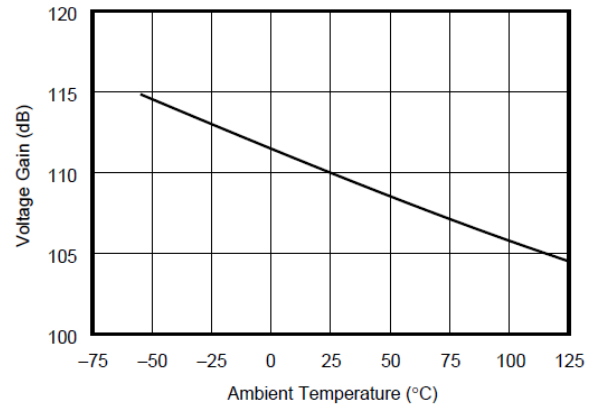


图 5-6. Open-Loop Gain vs Temperature

5.7 Typical Characteristics (continued)

at $T_A = 25^\circ\text{C}$, $V_S = \pm 15\text{V}$, $R_L = 10\text{k}\Omega$ connected to midsupply, and $V_{CM} = V_{OUT} = \text{midsupply}$ (unless otherwise noted)

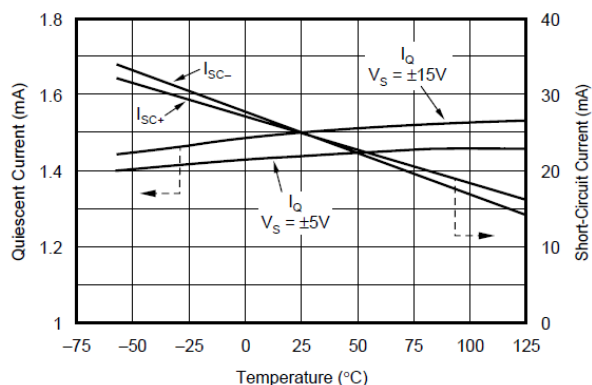


图 5-7. Quiescent Current and Short-Circuit Current vs Temperature

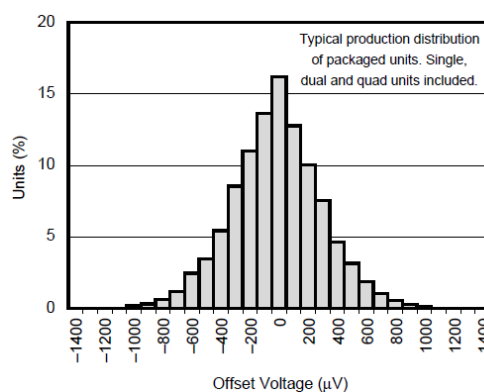


图 5-8. Offset Voltage Production Distribution

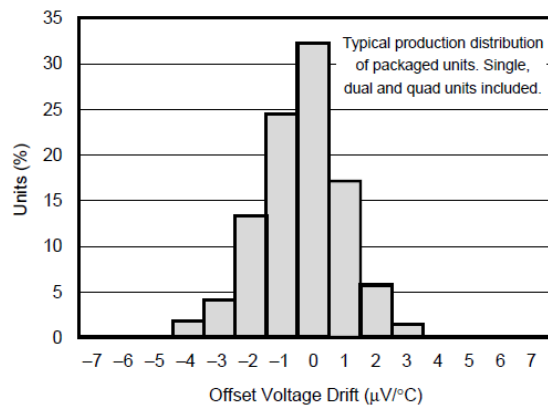


图 5-9. Offset Voltage Drift Production Distribution

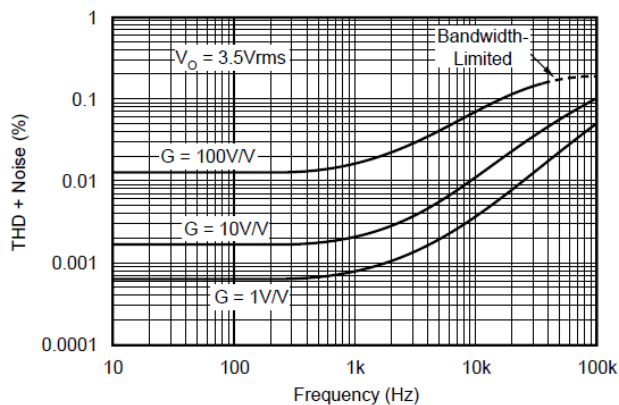


图 5-10. Total Harmonic Distortion + Noise vs Frequency

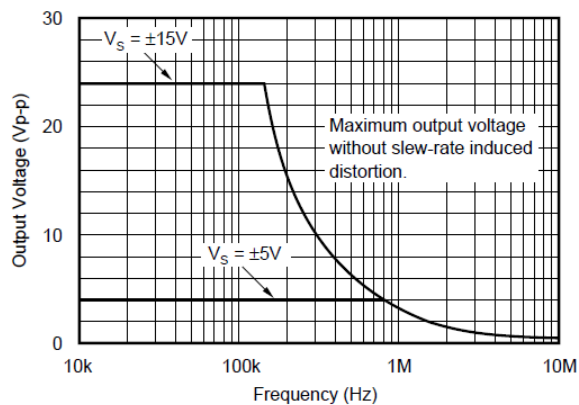


图 5-11. Maximum Output Voltage vs Frequency

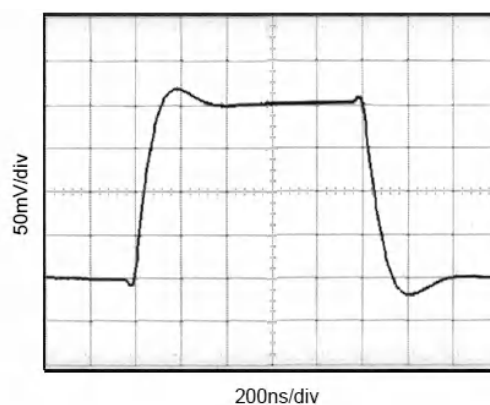


图 5-12. Small-Signal Step Response $G = 1$, $C_L = 300\text{pF}$

5.7 Typical Characteristics (continued)

at $T_A = 25^\circ\text{C}$, $V_S = \pm 15\text{V}$, $R_L = 10\text{k}\Omega$ connected to midsupply, and $V_{CM} = V_{OUT} = \text{midsupply}$ (unless otherwise noted)

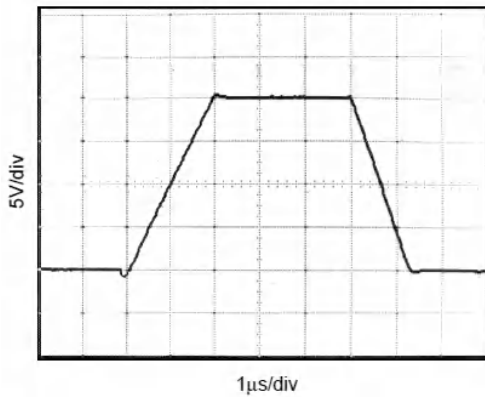


图 5-13. Large-Signal Step Response $G = 1$, $C_L = 300\text{pF}$

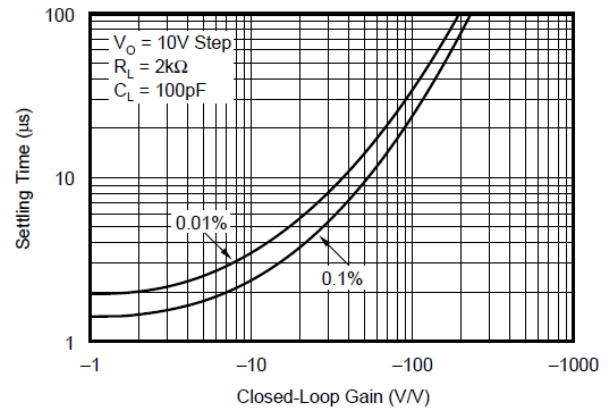


图 5-14. Settling Time vs Closed-Loop Gain

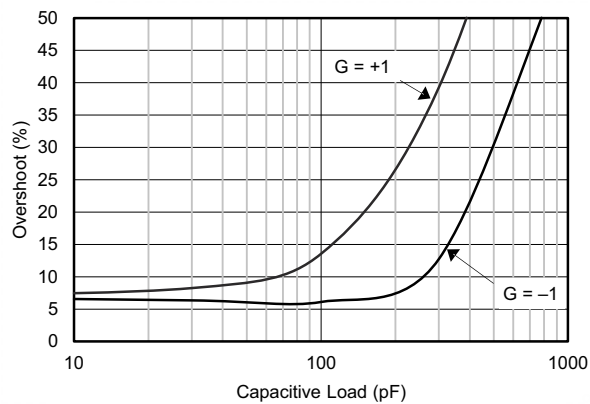


图 5-15. Small-Signal Overshoot vs Load Capacitance

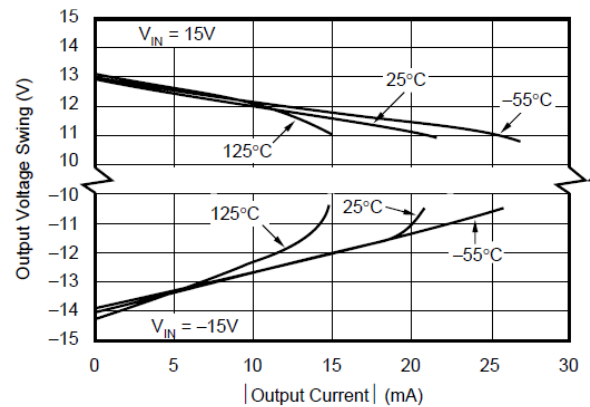


图 5-16. Output Voltage Swing vs Output Current

6 Application and Implementation

备注

Information in the following applications sections is not part of the TI component specification, and TI does not warrant its accuracy or completeness. TI's customers are responsible for determining suitability of components for their purposes, as well as validating and testing their design implementation to confirm system functionality.

6.1 Application Information

The OPAx131 series op amps are unity-gain stable and an excellent choice for a wide range of general-purpose applications. Bypass power-supply pins with 10nF ceramic capacitors or larger.

The OPAx131 series op amps are free from unexpected output phase-reversal common with FET op amps. Many FET-input op amps exhibit phase-reversal of the output when the input common-mode voltage range is exceeded. This can occur in voltage-follower circuits, causing serious problems in control-loop applications. All circuitry is completely independent in dual and quad versions, and normal behavior can be expected when one amplifier in a package is overdriven or short-circuited.

6.1.1 Offset Voltage Trim

The offset voltage of the OPAx131 amplifiers is laser trimmed and usually requires no user adjustment. The OPAx131 provide less than $\pm 1\text{mV}$ of input offset voltage and less than $10\mu\text{V}/^\circ\text{C}$ of input offset voltage drift over the operating temperature range.

6.2 Typical Application

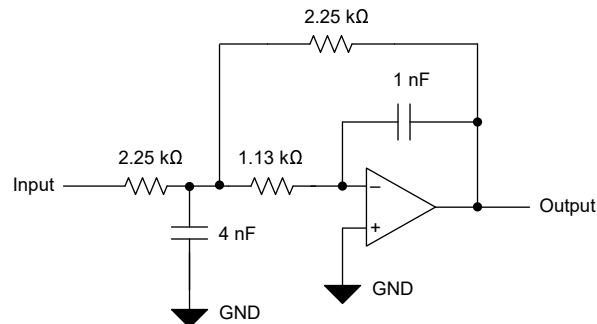


图 6-1. Second-Order Low-Pass Filter

6.2.1 Input Bias Current

The input bias current is approximately 5pA at room temperature and increases with temperature (see also 图 5-5). Input bias current also varies with common-mode voltage and power-supply voltage. This variation depends on the voltage between the negative power supply and the common-mode input voltage.

7 Device and Documentation Support

TI offers an extensive line of development tools. Tools and software to evaluate the performance of the device, generate code, and develop solutions are listed below.

7.1 接收文档更新通知

要接收文档更新通知，请导航至 [ti.com](https://www.ti.com) 上的器件产品文件夹。点击 [通知](#) 进行注册，即可每周接收产品信息更改摘要。有关更改的详细信息，请查看任何已修订文档中包含的修订历史记录。

7.2 支持资源

TI E2E™ [中文支持论坛](#) 是工程师的重要参考资料，可直接从专家处获得快速、经过验证的解答和设计帮助。搜索现有解答或提出自己的问题，获得所需的快速设计帮助。

链接的内容由各个贡献者“按原样”提供。这些内容并不构成 TI 技术规范，并且不一定反映 TI 的观点；请参阅 TI 的 [使用条款](#)。

7.3 Trademarks

TI E2E™ is a trademark of Texas Instruments.
所有商标均为其各自所有者的财产。

7.4 静电放电警告



静电放电 (ESD) 会损坏这个集成电路。德州仪器 (TI) 建议通过适当的预防措施处理所有集成电路。如果不遵守正确的处理和安装程序，可能会损坏集成电路。

ESD 的损坏小至导致微小的性能降级，大至整个器件故障。精密的集成电路可能更容易受到损坏，这是因为非常细微的参数更改都可能会导致器件与其发布的规格不相符。

7.5 术语表

[TI 术语表](#) 本术语表列出并解释了术语、首字母缩略词和定义。

8 Revision History

注：以前版本的页码可能与当前版本的页码不同

Changes from Revision A (December 2002) to Revision B (July 2024)	Page
• 更新了整个文档中的表格、图和交叉参考的编号格式.....	1
• 添加了 器件信息表 和 应用、引脚配置和功能、规格、建议运行条件、热性能信息、应用和实施、典型应用、器件和文档支持 以及 机械、封装和可订购信息 部分.....	1
• 更新了 说明	1
• Deleted obsolete PDIP packages for OPA131 and OPA2131.....	3
• Updated input voltage in <i>Absolute Maximum Ratings</i>	6
• Added input current and related footnote to <i>Absolute Maximum Ratings</i>	6
• Changed format of <i>Electrical Characteristics</i> to latest standard.....	8
• Updated nominal conditions in the header of <i>Electrical Characteristics</i>	8
• Deleted channel separation specification.....	8
• Updated common-mode voltage MAX value.....	8
• Updated common-mode rejection ratio and common-mode input impedance test conditions.....	8
• Changed differential input impedance from $10^{10}\Omega \parallel 1\text{pF}$ to $10^{10}\Omega \parallel 5\text{pF}$	8
• Changed common-mode input impedance from $10^{10}\Omega \parallel 3\text{pF}$ to $10^{10}\Omega \parallel 4.3\text{pF}$	8
• Updated open loop voltage gain MIN and TYP values for $R_L = 10\text{k}\Omega$ and $R_L = 2\text{k}\Omega$	8
• Updated settling time test condition.....	8
• Moved voltage output negative MIN values to MAX values.....	8
• Deleted note 1 from <i>Electrical Characteristics</i>	8

• Updated Figure 5-15, <i>Small-Signal Overshoot vs Load Capacitance</i>	9
• Updated text in <i>Offset Voltage Trim</i>	12
• Changed Figure 1, OPA130 Offset Voltage Trim Circuit, to Figure 6-1, Second-Order Low-Pass Filter.....	12
• Updated <i>Input Bias Current</i> description.....	12

9 Mechanical, Packaging, and Orderable Information

The following pages include mechanical, packaging, and orderable information. This information is the most current data available for the designated devices. This data is subject to change without notice and revision of this document. For browser-based versions of this data sheet, refer to the left-hand navigation.

PACKAGING INFORMATION

Orderable part number	Status (1)	Material type (2)	Package Pins	Package qty Carrier	RoHS (3)	Lead finish/ Ball material (4)	MSL rating/ Peak reflow (5)	Op temp (°C)	Part marking (6)
OPA131U	Active	Production	SOIC (D) 8	75 TUBE	Yes	Call TI Nipdau	Level-3-260C-168 HR	-55 to 125	(O131U, OPA) 131U
OPA131U.B	Active	Production	SOIC (D) 8	75 TUBE	Yes	Call TI	Level-3-260C-168 HR	-55 to 125	(O131U, OPA) 131U
OPA131UA	Active	Production	SOIC (D) 8	75 TUBE	Yes	Call TI Nipdau	Level-3-260C-168 HR	-55 to 125	(O131U, OPA) 131U A
OPA131UA.B	Active	Production	SOIC (D) 8	75 TUBE	Yes	Call TI	Level-3-260C-168 HR	-55 to 125	(O131U, OPA) 131U A
OPA131UA/2K5	Active	Production	SOIC (D) 8	2500 LARGE T&R	Yes	Call TI Nipdau	Level-3-260C-168 HR	-55 to 125	(O131U, OPA) 131U A
OPA131UA/2K5.B	Active	Production	SOIC (D) 8	2500 LARGE T&R	Yes	Call TI	Level-3-260C-168 HR	-55 to 125	(O131U, OPA) 131U A
OPA131UJ	Active	Production	SOIC (D) 8	75 TUBE	Yes	NIPDAU NIPDAU	Level-3-260C-168 HR	-55 to 125	(O131UJ, OPA) 131UJ
OPA131UJ.B	Active	Production	SOIC (D) 8	75 TUBE	Yes	NIPDAU	Level-3-260C-168 HR	-55 to 125	(O131UJ, OPA) 131UJ
OPA131UJ/2K5	Active	Production	SOIC (D) 8	2500 LARGE T&R	Yes	NIPDAU NIPDAU	Level-3-260C-168 HR	-55 to 125	(O131UJ, OPA) 131UJ
OPA131UJ/2K5.B	Active	Production	SOIC (D) 8	2500 LARGE T&R	Yes	NIPDAU	Level-3-260C-168 HR	-55 to 125	(O131UJ, OPA) 131UJ
OPA2131UA	Active	Production	SOIC (D) 8	75 TUBE	Yes	NIPDAU NIPDAU	Level-3-260C-168 HR	-55 to 125	(2131UA, OPA)
OPA2131UA.B	Active	Production	SOIC (D) 8	75 TUBE	Yes	NIPDAU	Level-3-260C-168 HR	-55 to 125	(2131UA, OPA)
OPA2131UA/2K5	Active	Production	SOIC (D) 8	2500 LARGE T&R	Yes	NIPDAU NIPDAU	Level-3-260C-168 HR	-55 to 125	(2131UA, OPA)
OPA2131UA/2K5.B	Active	Production	SOIC (D) 8	2500 LARGE T&R	Yes	NIPDAU	Level-3-260C-168 HR	-55 to 125	(2131UA, OPA)
OPA2131UJ	Active	Production	SOIC (D) 8	75 TUBE	Yes	NIPDAU NIPDAU	Level-3-260C-168 HR	-	(2131UJ, OPA)
OPA2131UJ.B	Active	Production	SOIC (D) 8	75 TUBE	Yes	NIPDAU	Level-3-260C-168 HR	-55 to 125	(2131UJ, OPA)
OPA2131UJ/2K5	Active	Production	SOIC (D) 8	2500 LARGE T&R	Yes	NIPDAU NIPDAU	Level-3-260C-168 HR	-	(2131UJ, OPA)
OPA2131UJ/2K5.B	Active	Production	SOIC (D) 8	2500 LARGE T&R	Yes	NIPDAU	Level-3-260C-168 HR	-55 to 125	(2131UJ, OPA)
OPA4131NA	Active	Production	SOIC (D) 14	50 TUBE	Yes	NIPDAU-DCC	Level-3-260C-168 HR	-40 to 85	OPA4131NA

Orderable part number	Status (1)	Material type (2)	Package Pins	Package qty Carrier	RoHS (3)	Lead finish/ Ball material (4)	MSL rating/ Peak reflow (5)	Op temp (°C)	Part marking (6)
OPA4131NA.A	Active	Production	SOIC (D) 14	50 TUBE	Yes	NIPDAU-DCC	Level-3-260C-168 HR	-40 to 85	OPA4131NA
OPA4131NA.B	Active	Production	SOIC (D) 14	50 TUBE	Yes	NIPDAU-DCC	Level-3-260C-168 HR	-40 to 85	OPA4131NA
OPA4131NJ	Active	Production	SOIC (D) 14	50 TUBE	Yes	NIPDAU-DCC	Level-3-260C-168 HR	-40 to 85	OPA4131NJ
OPA4131NJ.A	Active	Production	SOIC (D) 14	50 TUBE	Yes	NIPDAU-DCC	Level-3-260C-168 HR	-40 to 85	OPA4131NJ
OPA4131NJ.B	Active	Production	SOIC (D) 14	50 TUBE	Yes	NIPDAU-DCC	Level-3-260C-168 HR	-40 to 85	OPA4131NJ
OPA4131PA	Active	Production	PDIP (N) 14	25 TUBE	Yes	NIPDAU	N/A for Pkg Type	-40 to 85	OPA4131PA
OPA4131PA.A	Active	Production	PDIP (N) 14	25 TUBE	Yes	NIPDAU	N/A for Pkg Type	-40 to 85	OPA4131PA
OPA4131PAG4	Active	Production	PDIP (N) 14	25 TUBE	Yes	NIPDAU	N/A for Pkg Type	-40 to 85	OPA4131PA
OPA4131PJ	Active	Production	PDIP (N) 14	25 TUBE	Yes	NIPDAU	N/A for Pkg Type	-40 to 85	OPA4131PJ
OPA4131PJ.A	Active	Production	PDIP (N) 14	25 TUBE	Yes	NIPDAU	N/A for Pkg Type	-40 to 85	OPA4131PJ
OPA4131UA	Active	Production	SOIC (DW) 16	40 TUBE	Yes	NIPDAU-DCC	Level-3-260C-168 HR	-40 to 85	OPA4131UA
OPA4131UA.A	Active	Production	SOIC (DW) 16	40 TUBE	Yes	NIPDAU-DCC	Level-3-260C-168 HR	-40 to 85	OPA4131UA
OPA4131UA/1K	Active	Production	SOIC (DW) 16	1000 LARGE T&R	Yes	NIPDAU-DCC	Level-3-260C-168 HR	-40 to 85	OPA4131UA
OPA4131UA/1K.A	Active	Production	SOIC (DW) 16	1000 LARGE T&R	Yes	NIPDAU-DCC	Level-3-260C-168 HR	-40 to 85	OPA4131UA

⁽¹⁾ **Status:** For more details on status, see our [product life cycle](#).

⁽²⁾ **Material type:** When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, reliability performance testing, and/or process qualification, may not yet be complete, and this item is subject to further changes or possible discontinuation. If available for ordering, purchases will be subject to an additional waiver at checkout, and are intended for early internal evaluation purposes only. These items are sold without warranties of any kind.

⁽³⁾ **RoHS values:** Yes, No, RoHS Exempt. See the [TI RoHS Statement](#) for additional information and value definition.

⁽⁴⁾ **Lead finish/Ball material:** Parts may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

⁽⁵⁾ **MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.

⁽⁶⁾ **Part marking:** There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "-" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

Important Information and Disclaimer: The information provided on this page represents TI's knowledge and belief as of the date that it is provided. TI bases its knowledge and belief on information provided by third parties, and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. TI has taken and continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. TI and TI suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.

In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

TAPE AND REEL INFORMATION



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
OPA131UA/2K5	SOIC	D	8	2500	330.0	12.4	6.4	5.2	2.1	8.0	12.0	Q1
OPA131UA/2K5	SOIC	D	8	2500	330.0	12.4	6.4	5.2	2.1	8.0	12.0	Q1
OPA131UJ/2K5	SOIC	D	8	2500	330.0	12.4	6.4	5.2	2.1	8.0	12.0	Q1
OPA131UJ/2K5	SOIC	D	8	2500	330.0	12.4	6.4	5.2	2.1	8.0	12.0	Q1
OPA2131UA/2K5	SOIC	D	8	2500	330.0	12.4	6.4	5.2	2.1	8.0	12.0	Q1
OPA2131UA/2K5	SOIC	D	8	2500	330.0	12.4	6.4	5.2	2.1	8.0	12.0	Q1
OPA2131UJ/2K5	SOIC	D	8	2500	330.0	12.4	6.4	5.2	2.1	8.0	12.0	Q1
OPA2131UJ/2K5	SOIC	D	8	2500	330.0	12.4	6.4	5.2	2.1	8.0	12.0	Q1
OPA4131UA/1K	SOIC	DW	16	1000	330.0	16.4	10.75	10.7	2.7	12.0	16.0	Q1

TAPE AND REEL BOX DIMENSIONS



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
OPA131UA/2K5	SOIC	D	8	2500	356.0	356.0	35.0
OPA131UA/2K5	SOIC	D	8	2500	353.0	353.0	32.0
OPA131UJ/2K5	SOIC	D	8	2500	356.0	356.0	35.0
OPA131UJ/2K5	SOIC	D	8	2500	356.0	356.0	35.0
OPA2131UA/2K5	SOIC	D	8	2500	353.0	353.0	32.0
OPA2131UA/2K5	SOIC	D	8	2500	356.0	356.0	35.0
OPA2131UJ/2K5	SOIC	D	8	2500	356.0	356.0	35.0
OPA2131UJ/2K5	SOIC	D	8	2500	356.0	356.0	35.0
OPA4131UA/1K	SOIC	DW	16	1000	356.0	356.0	35.0

TUBE



*All dimensions are nominal

Device	Package Name	Package Type	Pins	SPQ	L (mm)	W (mm)	T (μm)	B (mm)
OPA131U	D	SOIC	8	75	506.6	8	3940	4.32
OPA131U.B	D	SOIC	8	75	506.6	8	3940	4.32
OPA131UA	D	SOIC	8	75	506.6	8	3940	4.32
OPA131UA.B	D	SOIC	8	75	506.6	8	3940	4.32
OPA131UJ	D	SOIC	8	75	506.6	8	3940	4.32
OPA131UJ.B	D	SOIC	8	75	506.6	8	3940	4.32
OPA2131UA	D	SOIC	8	75	506.6	8	3940	4.32
OPA2131UA.B	D	SOIC	8	75	506.6	8	3940	4.32
OPA2131UJ	D	SOIC	8	75	506.6	8	3940	4.32
OPA2131UJ.B	D	SOIC	8	75	506.6	8	3940	4.32
OPA4131NA	D	SOIC	14	50	506.6	8	3940	4.32
OPA4131NA.A	D	SOIC	14	50	506.6	8	3940	4.32
OPA4131NA.B	D	SOIC	14	50	506.6	8	3940	4.32
OPA4131NJ	D	SOIC	14	50	506.6	8	3940	4.32
OPA4131NJ.A	D	SOIC	14	50	506.6	8	3940	4.32
OPA4131NJ.B	D	SOIC	14	50	506.6	8	3940	4.32
OPA4131PA	N	PDIP	14	25	506	13.97	11230	4.32
OPA4131PA.A	N	PDIP	14	25	506	13.97	11230	4.32
OPA4131PAG4	N	PDIP	14	25	506	13.97	11230	4.32
OPA4131PJ	N	PDIP	14	25	506	13.97	11230	4.32
OPA4131PJ.A	N	PDIP	14	25	506	13.97	11230	4.32
OPA4131UA	DW	SOIC	16	40	507	12.83	5080	6.6
OPA4131UA.A	DW	SOIC	16	40	507	12.83	5080	6.6

D0014A**PACKAGE OUTLINE****SOIC - 1.75 mm max height**

SMALL OUTLINE INTEGRATED CIRCUIT



4220718/A 09/2016

NOTES:

1. All linear dimensions are in millimeters. Dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 mm, per side.
4. This dimension does not include interlead flash. Interlead flash shall not exceed 0.43 mm, per side.
5. Reference JEDEC registration MS-012, variation AB.

EXAMPLE BOARD LAYOUT

D0014A

SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT



LAND PATTERN EXAMPLE
SCALE:8X



SOLDER MASK DETAILS

4220718/A 09/2016

NOTES: (continued)

6. Publication IPC-7351 may have alternate designs.

7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

EXAMPLE STENCIL DESIGN

D0014A

SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT



SOLDER PASTE EXAMPLE
BASED ON 0.125 mm THICK STENCIL
SCALE:8X

4220718/A 09/2016

NOTES: (continued)

8. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
9. Board assembly site may have different recommendations for stencil design.

GENERIC PACKAGE VIEW

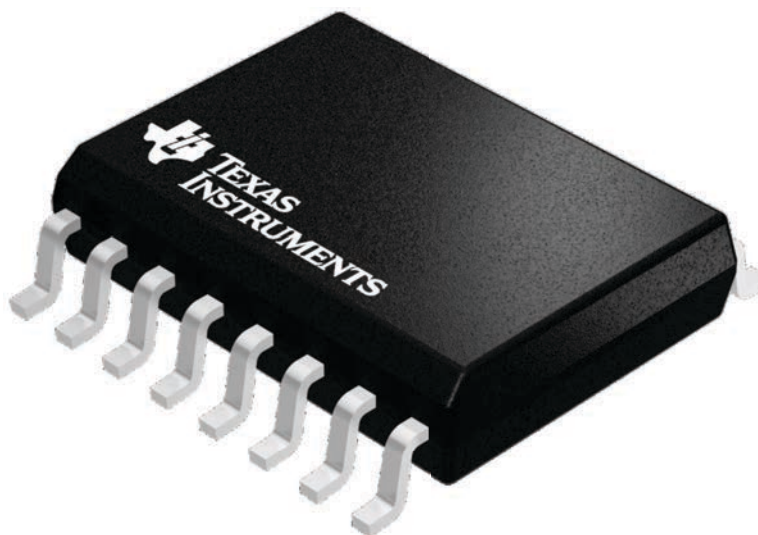
DW 16

SOIC - 2.65 mm max height

7.5 x 10.3, 1.27 mm pitch

SMALL OUTLINE INTEGRATED CIRCUIT

This image is a representation of the package family, actual package may vary.
Refer to the product data sheet for package details.



4224780/A

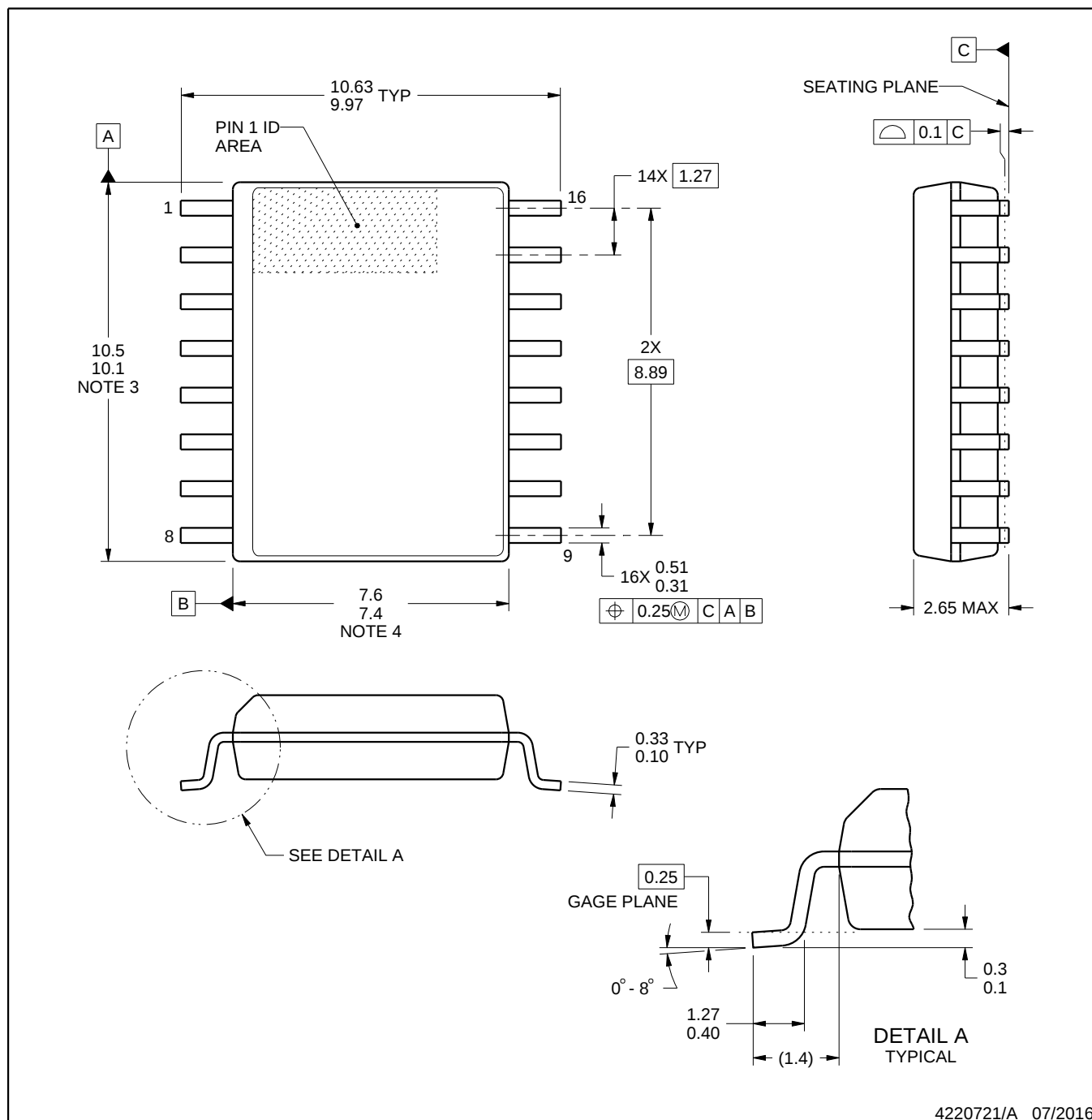


DW0016A

PACKAGE OUTLINE

SOIC - 2.65 mm max height

SOIC



4220721/A 07/2016

NOTES:

1. All linear dimensions are in millimeters. Dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 mm, per side.
4. This dimension does not include interlead flash. Interlead flash shall not exceed 0.25 mm, per side.
5. Reference JEDEC registration MS-013.

EXAMPLE BOARD LAYOUT

DW0016A

SOIC - 2.65 mm max height

SOIC



LAND PATTERN EXAMPLE
SCALE:7X



SOLDER MASK DETAILS

4220721/A 07/2016

NOTES: (continued)

6. Publication IPC-7351 may have alternate designs.

7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

EXAMPLE STENCIL DESIGN

DW0016A

SOIC - 2.65 mm max height

SOIC



SOLDER PASTE EXAMPLE
BASED ON 0.125 mm THICK STENCIL
SCALE:7X

4220721/A 07/2016

NOTES: (continued)

8. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
9. Board assembly site may have different recommendations for stencil design.



PACKAGE OUTLINE

SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT



1. Linear dimensions are in inches [millimeters]. Dimensions in parenthesis are for reference only. Controlling dimensions are in inches. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed .006 [0.15] per side.
4. This dimension does not include interlead flash.
5. Reference JEDEC registration MS-012, variation AA.

D0008A

SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE:8X



SOLDER MASK DETAILS

4214825/C 02/2019

NOTES: (continued)

6. Publication IPC-7351 may have alternate designs.

7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

EXAMPLE STENCIL DESIGN

D0008A

SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT



SOLDER PASTE EXAMPLE
BASED ON .005 INCH [0.125 MM] THICK STENCIL
SCALE:8X

4214825/C 02/2019

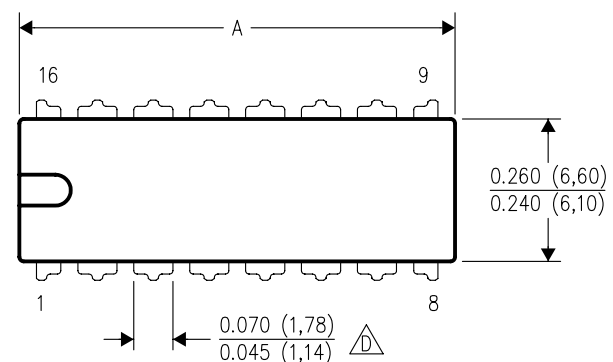
NOTES: (continued)

8. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
9. Board assembly site may have different recommendations for stencil design.

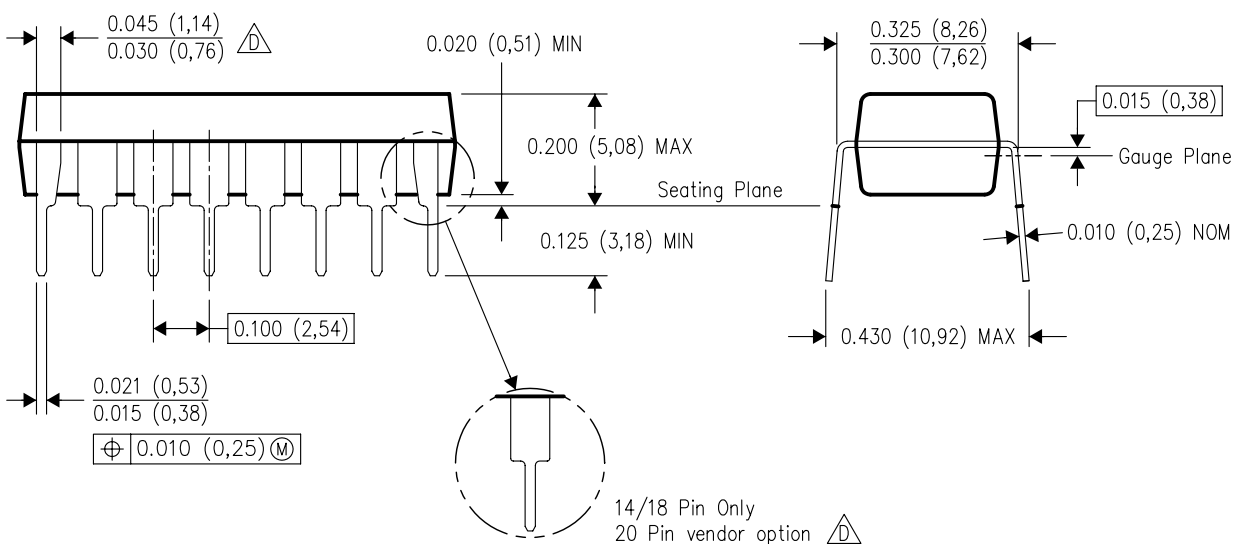
N (R-PDIP-T**)

16 PINS SHOWN

PLASTIC DUAL-IN-LINE PACKAGE



PINS ** DIM	14	16	18	20
A MAX	0.775 (19,69)	0.775 (19,69)	0.920 (23,37)	1.060 (26,92)
A MIN	0.745 (18,92)	0.745 (18,92)	0.850 (21,59)	0.940 (23,88)
MS-001 VARIATION	AA	BB	AC	AD



4040049/E 12/2002

NOTES:

- A. All linear dimensions are in inches (millimeters).
B. This drawing is subject to change without notice.
-  Falls within JEDEC MS-001, except 18 and 20 pin minimum body length (Dim A).
 The 20 pin end lead shoulder width is a vendor option, either half or full width.

重要通知和免责声明

TI“按原样”提供技术和可靠性数据（包括数据表）、设计资源（包括参考设计）、应用或其他设计建议、网络工具、安全信息和其他资源，不保证没有瑕疵且不做任何明示或暗示的担保，包括但不限于对适销性、某特定用途方面的适用性或不侵犯任何第三方知识产权的暗示担保。

这些资源可供使用 TI 产品进行设计的熟练开发人员使用。您将自行承担以下全部责任：(1) 针对您的应用选择合适的 TI 产品，(2) 设计、验证并测试您的应用，(3) 确保您的应用满足相应标准以及任何其他功能安全、信息安全、监管或其他要求。

这些资源如有变更，恕不另行通知。TI 授权您仅可将这些资源用于研发本资源所述的 TI 产品的相关应用。严禁以其他方式对这些资源进行复制或展示。您无权使用任何其他 TI 知识产权或任何第三方知识产权。您应全额赔偿因在这些资源的使用中对 TI 及其代表造成的任何索赔、损害、成本、损失和债务，TI 对此概不负责。

TI 提供的产品受 [TI 的销售条款](#) 或 [ti.com](#) 上其他适用条款/TI 产品随附的其他适用条款的约束。TI 提供这些资源并不会扩展或以其他方式更改 TI 针对 TI 产品发布的适用的担保或担保免责声明。

TI 反对并拒绝您可能提出的任何其他或不同的条款。

邮寄地址：Texas Instruments, Post Office Box 655303, Dallas, Texas 75265
版权所有 © 2025，德州仪器 (TI) 公司