

OPAx131 汎用 FET 入力オペアンプ

1 特長

- FET 入力: I_B = 最大 50pA
- 低いオフセット電圧: 750 μ V (最大値)
- 幅広い電源電圧範囲: $\pm 4.5V \sim \pm 18V$
- スルーレート: 10V/ μ s
- 広い帯域幅: 4MHz
- 高い容量性負荷駆動能力
- シングル、デュアル、クワッドの各バージョン

2 アプリケーション

- データアキュイジション (DAQ)
- 流量トランスミッタ
- 実験室およびフィールド向け計測機器
- 心電図 (ECG)

3 概要

OPAx131 シリーズの FET 入力オペアンプは、低コストで高性能を実現します。業界標準のピン配置を採用した OPA131 シングル、OPA2131 デュアル、および OPA4131 クワッドのバージョンがあり、コスト効率の優れた設計オプションが実現します。

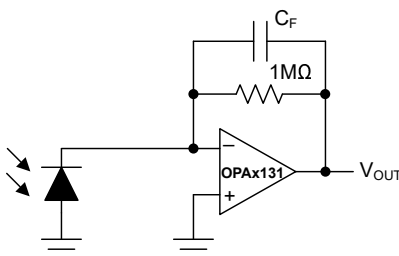
OPAx131 シリーズは、低いオフセット電圧、ドリフト、高い動的特性などの優れた汎用性能を備えています。

シングルとデュアルのバージョンは、8 ピンの SOIC 表面実装パッケージで供給されます。クワッドバージョンは、14 ピン および 16 ピン SOIC 表面実装パッケージと 14 ピン PDIP パッケージで供給されます。

製品情報

部品番号	チャンネル数	パッケージ ⁽¹⁾
OPA131	シングル	D (SOIC, 8)
OPA2131	デュアル	D (SOIC, 8)
OPA4131	クワッド	D (SOIC, 14)
		DW (SOIC, 16)
		N (PDIP, 14)

(1) 詳細については、[セクション 9](#) を参照してください。



トランスインピーダンス アンプの概略図



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4 Pin Configuration and Functions

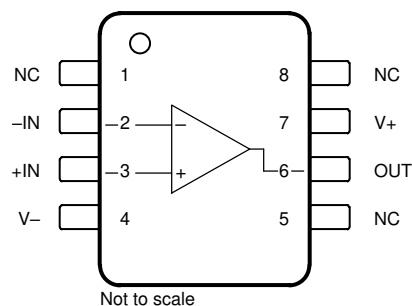


図 4-1. OPA131 D Package, 8-Pin SOIC (Top View)

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.

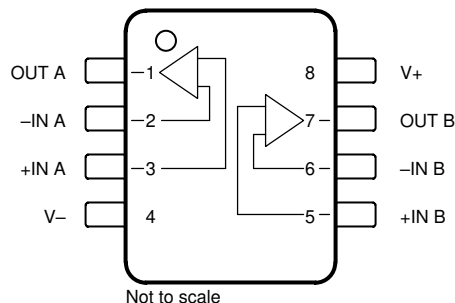


図 4-2. OPA2131 D Package, 8-Pin SOIC (Top View)

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

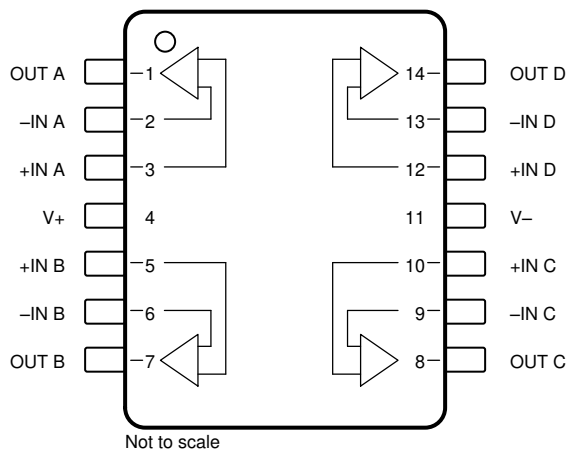


図 4-3. OPA4131 D Package, 14-Pin SOIC, and N Package, 14-Pin PDIP (Top View)

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

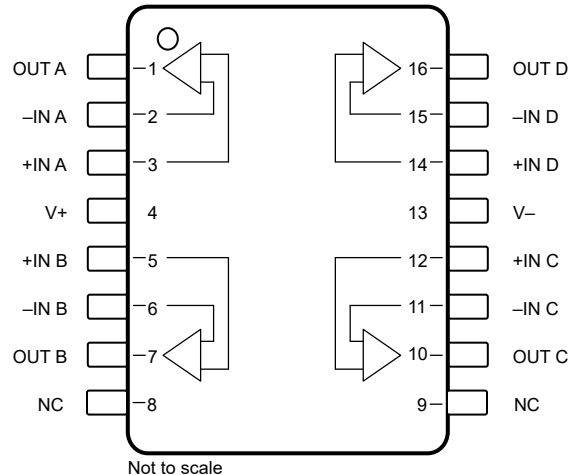


図 4-4. OPA4131 DW Package, 16-Pin SOIC (Top View)

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	μV/°C
PSRR	Power-supply rejection ratio	9V ≤ V _S ≤ 36V	OPAx131UA, OPA2131U, OPA4131U		±50	±200	μV/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/μs
	Settling time	10V step, G = 1	0.1%	1.5			μs
			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 = 2kΩ	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)

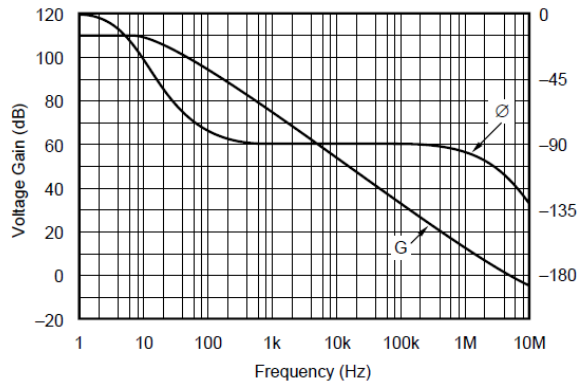


FIG 5-1. Open-Loop Gain and Phase vs Frequency

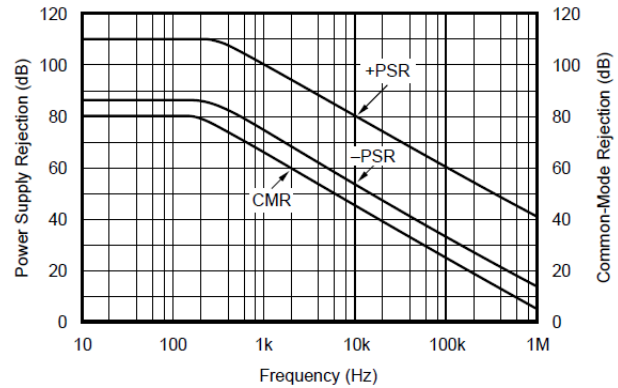


FIG 5-2. Power Supply and Common-Mode Rejection vs Frequency

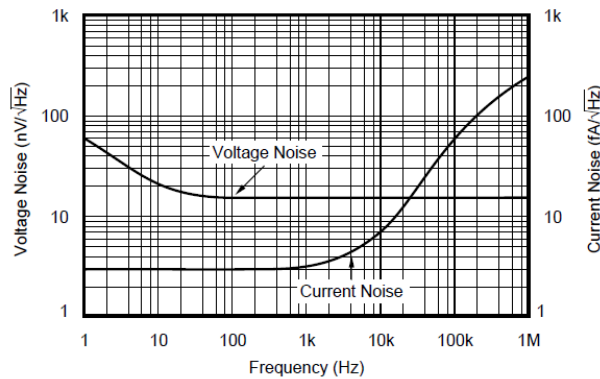


FIG 5-3. Input Voltage and Current Noise Spectral Density vs Frequency

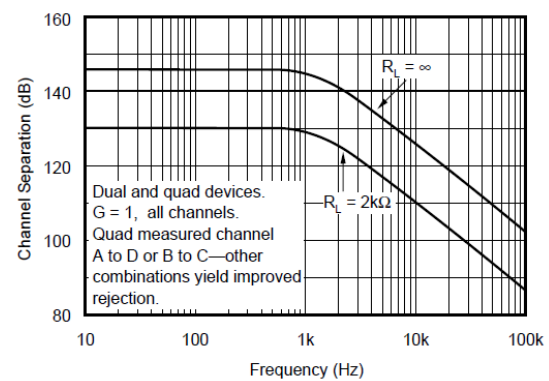


FIG 5-4. Channel Separation vs Frequency

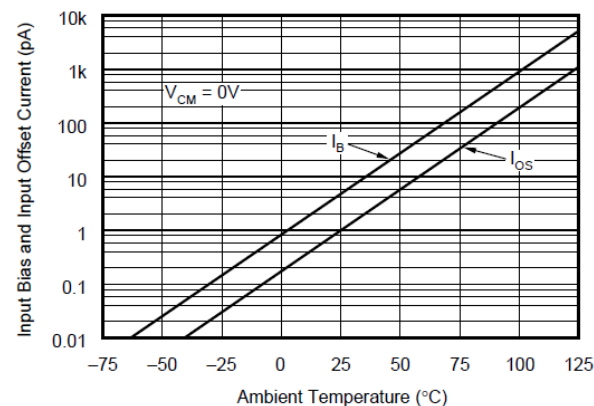


FIG 5-5. Input Bias and Input Offset Current vs Temperature

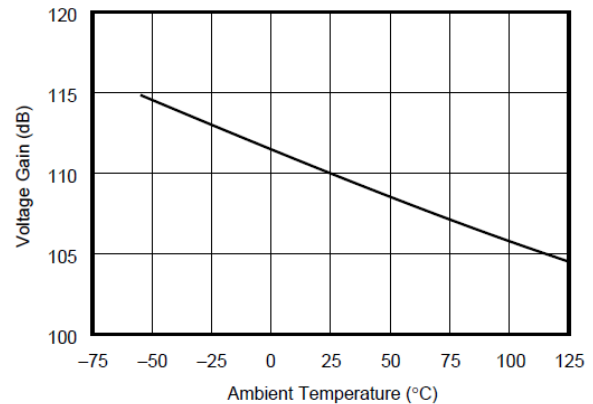


FIG 5-6. Open-Loop Gain vs Temperature

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)

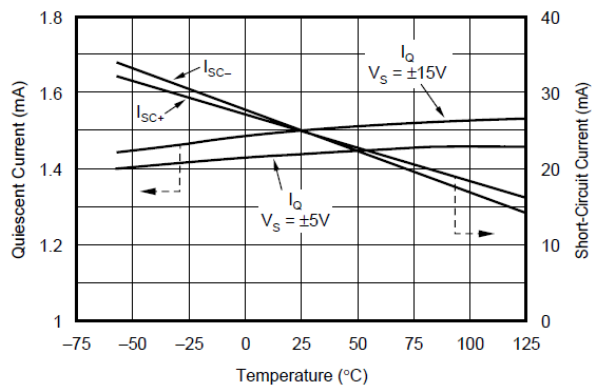


图 5-7. Quiescent Current and Short-Circuit Current vs Temperature

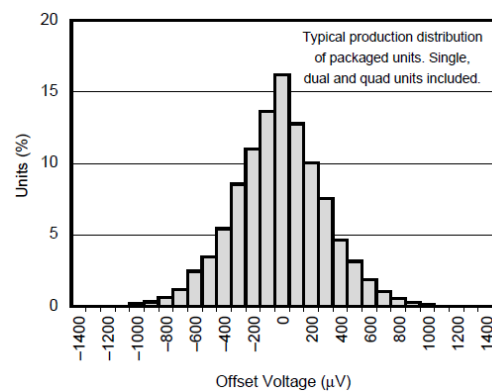


图 5-8. Offset Voltage Production Distribution

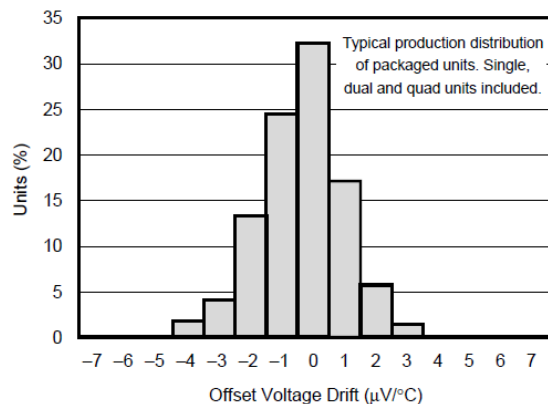


图 5-9. Offset Voltage Drift Production Distribution

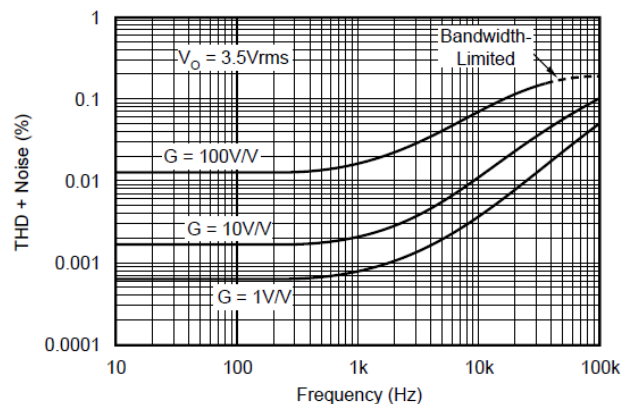


图 5-10. Total Harmonic Distortion + Noise vs Frequency

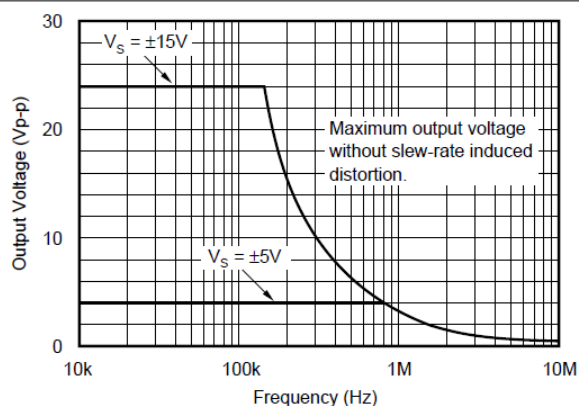


图 5-11. Maximum Output Voltage vs Frequency

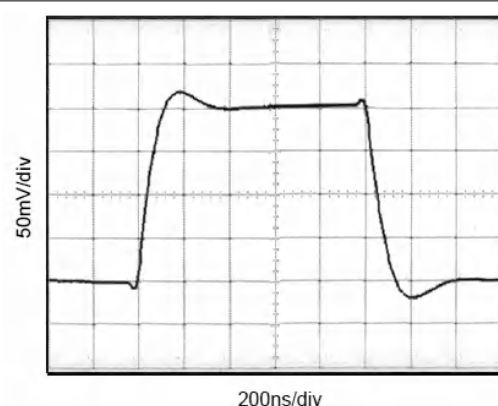


图 5-12. Small-Signal Step Response $G = 1$, $C_L = 300\text{pF}$

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)

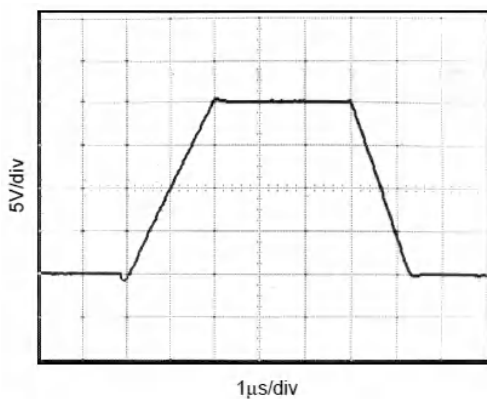


图 5-13. Large-Signal Step Response $G = 1$, $C_L = 300\text{pF}$

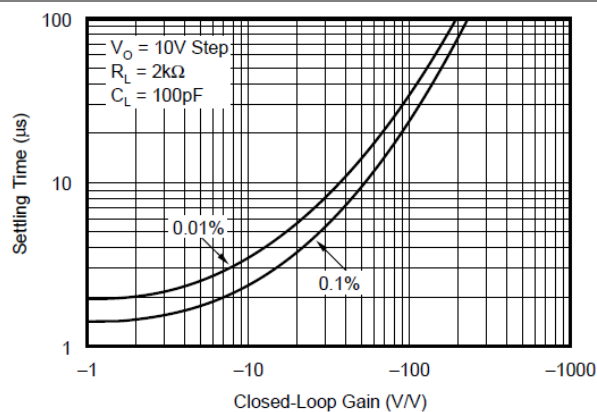


图 5-14. Settling Time vs Closed-Loop Gain

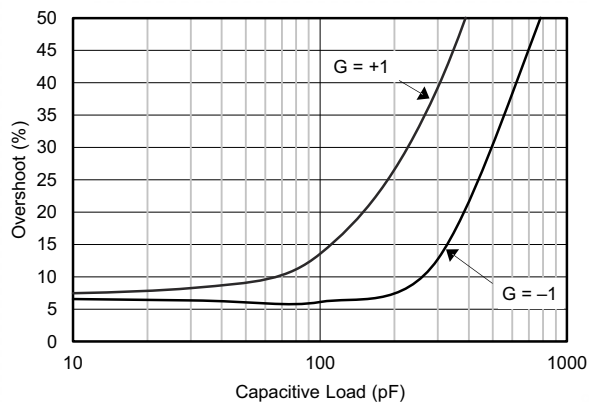


图 5-15. Small-Signal Overshoot vs Load Capacitance

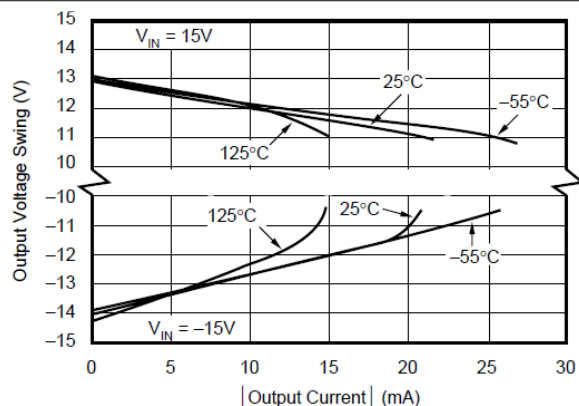


图 5-16. Output Voltage Swing vs Output Current

6 Application and Implementation

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

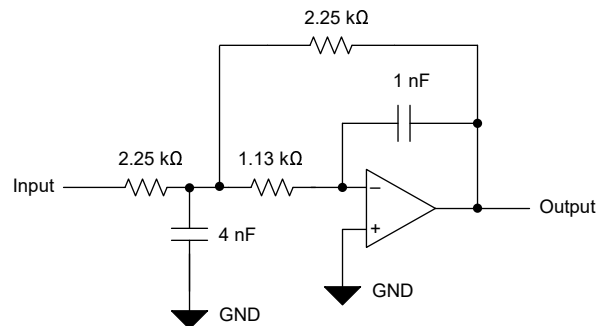


图 6-1. Second-Order Low-Pass Filter

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 ドキュメントの更新通知を受け取る方法

ドキュメントの更新についての通知を受け取るには、www.tij.co.jp のデバイス製品フォルダを開いてください。[通知] をクリックして登録すると、変更されたすべての製品情報に関するダイジェストを毎週受け取ることができます。変更の詳細については、改訂されたドキュメントに含まれている改訂履歴をご覧ください。

7.2 サポート・リソース

テキサス・インスツルメンツ E2E™ サポート・フォーラムは、エンジニアが検証済みの回答と設計に関するヒントをエキスパートから迅速かつ直接得ることができる場所です。既存の回答を検索したり、独自の質問をしたりすることで、設計に必要な支援を迅速に得ることができます。

リンクされているコンテンツは、各寄稿者により「現状のまま」提供されるものです。これらはテキサス・インスツルメンツの仕様を構成するものではなく、必ずしもテキサス・インスツルメンツの見解を反映したものではありません。テキサス・インスツルメンツの[使用条件](#)を参照してください。

7.3 Trademarks

テキサス・インスツルメンツ E2E™ is a trademark of Texas Instruments.

すべての商標は、それぞれの所有者に帰属します。

7.4 静電気放電に関する注意事項



この IC は、ESD によって破損する可能性があります。テキサス・インスツルメンツは、IC を取り扱う際には常に適切な注意を払うことを推奨します。正しい取り扱いおよび設置手順に従わない場合、デバイスを破損するおそれがあります。

ESD による破損は、わずかな性能低下からデバイスの完全な故障まで多岐にわたります。精密な IC の場合、パラメータがわずかに変化するだけで公表されている仕様から外れる可能性があるため、破損が発生しやすくなっています。

7.5 用語集

[テキサス・インスツルメンツ用語集](#) この用語集には、用語や略語の一覧および定義が記載されています。

8 Revision History

資料番号末尾の英字は改訂を表しています。その改訂履歴は英語版に準じています。

Changes from Revision A (December 2002) to Revision B (July 2024)	Page
ドキュメント全体にわたって表、図、相互参照の採番方法を更新.....	1
「製品情報」表、「アプリケーション」、「ピン構成および機能」、「仕様」、「推奨動作条件」、「熱に関する情報」、「アプリケーションと実装」、「代表的なアプリケーション」、「デバイスおよびドキュメントのサポート」、「メカニカル、パッケージ、および注文情報」セクションを追加	1
「概要」を更新	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.

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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	-	Call TI	Level-3-260C-168 HR	-55 to 125	(O131U, OPA) 131U
OPA131U.B	Active	Production	SOIC (D) 8	75 TUBE	-	Call TI	Level-3-260C-168 HR	-40 to 85	(O131U, OPA) 131U
OPA131UA	Active	Production	SOIC (D) 8	75 TUBE	-	Call TI	Level-3-260C-168 HR	-55 to 125	(O131U, OPA) 131U A
OPA131UA.B	Active	Production	SOIC (D) 8	75 TUBE	-	Call TI	Level-3-260C-168 HR	-40 to 85	(O131U, OPA) 131U A
OPA131UA/2K5	Active	Production	SOIC (D) 8	2500 LARGE T&R	-	Call TI	Level-3-260C-168 HR	-55 to 125	(O131U, OPA) 131U A
OPA131UA/2K5.B	Active	Production	SOIC (D) 8	2500 LARGE T&R	-	Call TI	Level-3-260C-168 HR	-40 to 85	(O131U, OPA) 131U A
OPA131UJ	Active	Production	SOIC (D) 8	75 TUBE	Yes	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	-40 to 85	(O131UJ, OPA) 131UJ
OPA131UJ/2K5	Active	Production	SOIC (D) 8	2500 LARGE T&R	Yes	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	-40 to 85	(O131UJ, OPA) 131UJ
OPA2131UA	Active	Production	SOIC (D) 8	75 TUBE	Yes	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	-40 to 85	(2131UA, OPA)
OPA2131UA/2K5	Active	Production	SOIC (D) 8	2500 LARGE T&R	Yes	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	-40 to 85	(2131UA, OPA)
OPA2131UJ	Active	Production	SOIC (D) 8	75 TUBE	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 85	(2131UJ, OPA)
OPA2131UJ.B	Active	Production	SOIC (D) 8	75 TUBE	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 85	(2131UJ, OPA)
OPA2131UJ/2K5	Active	Production	SOIC (D) 8	2500 LARGE T&R	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 85	(2131UJ, OPA)
OPA2131UJ/2K5.B	Active	Production	SOIC (D) 8	2500 LARGE T&R	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 85	(2131UJ, OPA)
OPA4131NA	Active	Production	SOIC (D) 14	50 TUBE	Yes	NIPDAUAG	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	NIPDAUAG	Level-3-260C-168 HR	-40 to 85	OPA4131NA
OPA4131NJ	Active	Production	SOIC (D) 14	50 TUBE	Yes	NIPDAUAG	Level-3-260C-168 HR	-40 to 85	OPA4131NJ
OPA4131NJ.A	Active	Production	SOIC (D) 14	50 TUBE	Yes	NIPDAUAG	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	NIPDAUAG	Level-3-260C-168 HR	-40 to 85	OPA4131UA
OPA4131UA.A	Active	Production	SOIC (DW) 16	40 TUBE	Yes	NIPDAUAG	Level-3-260C-168 HR	-40 to 85	OPA4131UA
OPA4131UA/1K	Active	Production	SOIC (DW) 16	1000 LARGE T&R	Yes	NIPDAUAG	Level-3-260C-168 HR	-40 to 85	OPA4131UA
OPA4131UA/1K.A	Active	Production	SOIC (DW) 16	1000 LARGE T&R	Yes	NIPDAUAG	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.

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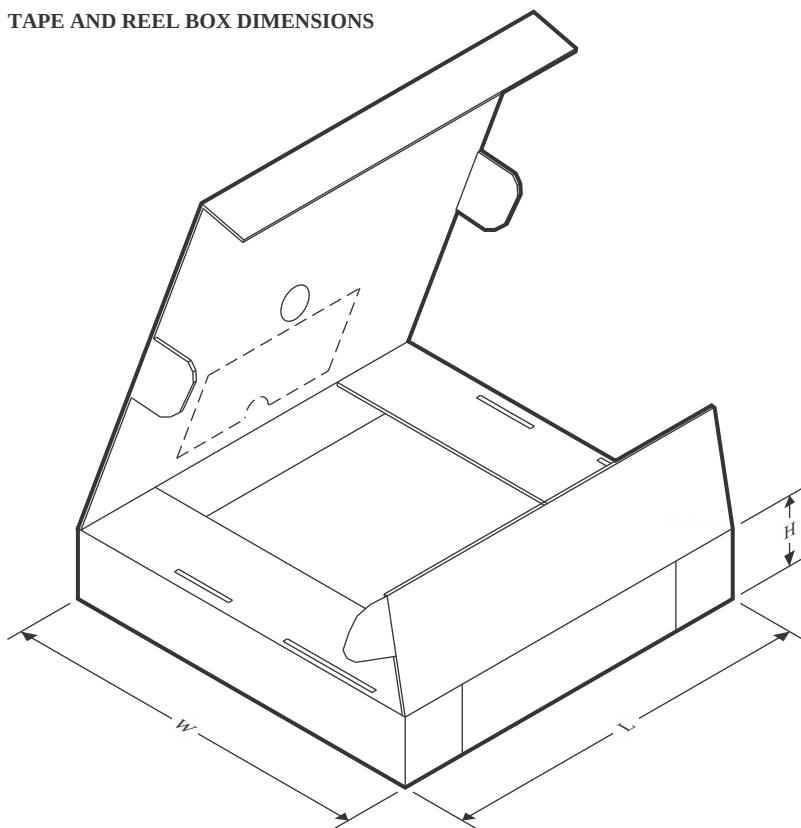
TAPE AND REEL INFORMATION



*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
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
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



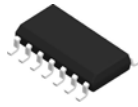
*All dimensions are nominal

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

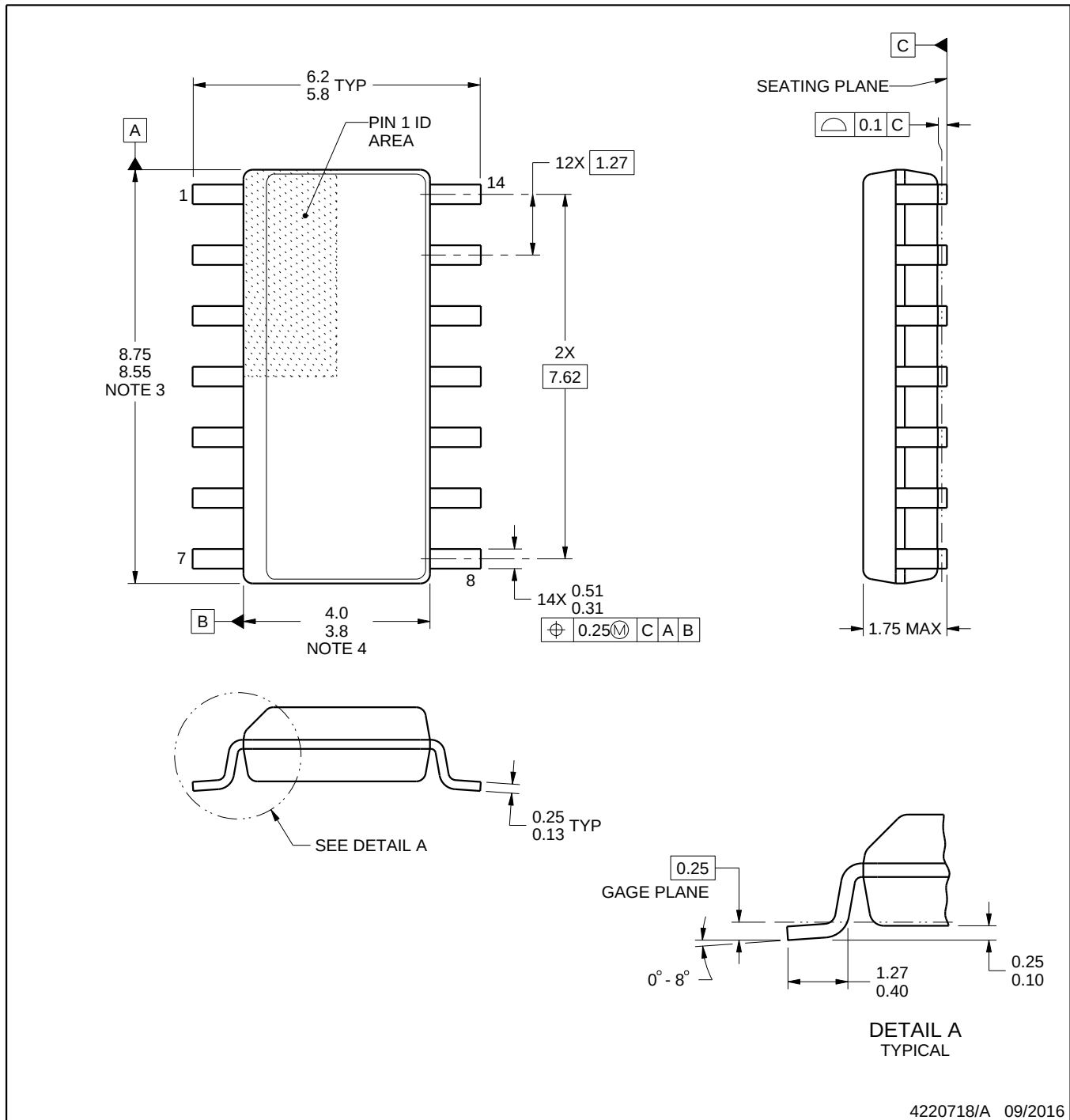
TUBE


*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
OPA4131NJ	D	SOIC	14	50	506.6	8	3940	4.32
OPA4131NJ.A	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

**NOTES:**

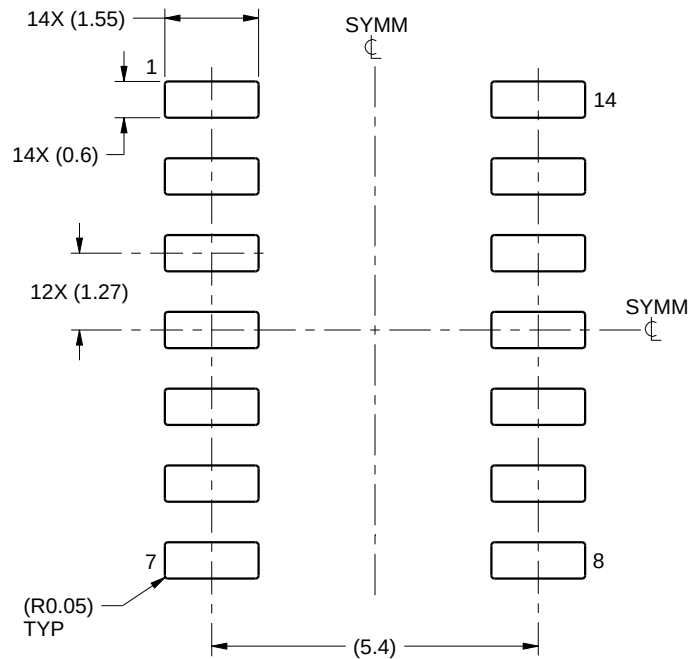
1. All linear dimensions are in millimeters. Dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate 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

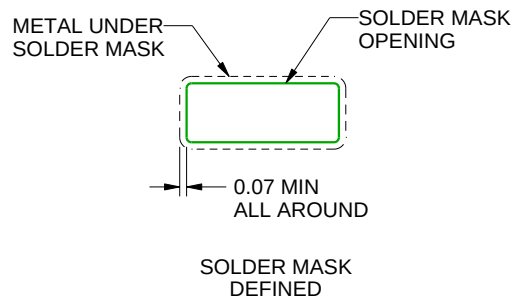
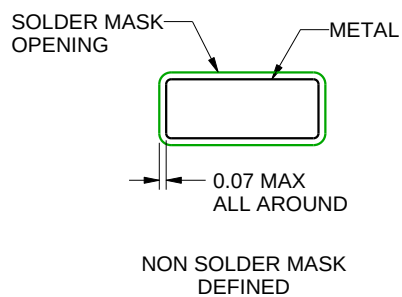
D0014A

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.

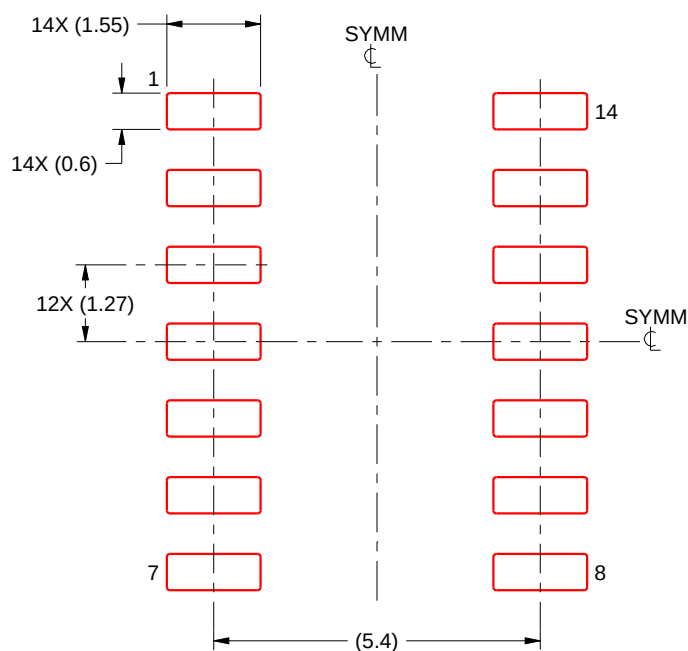
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

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

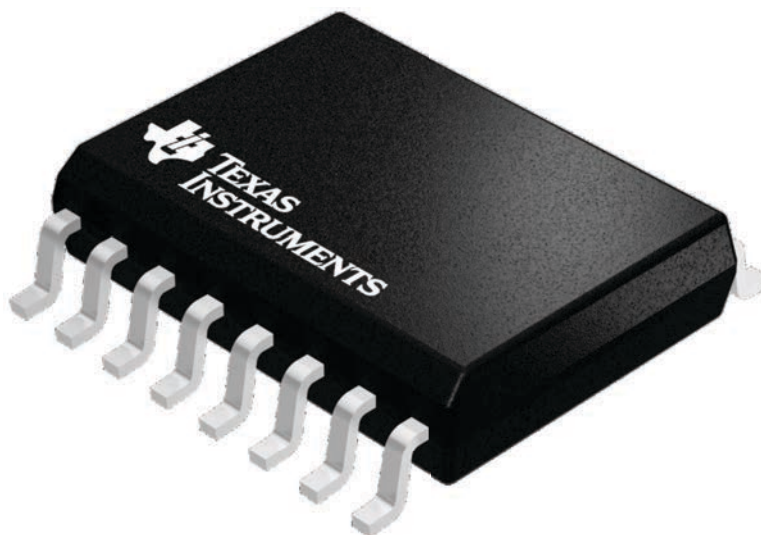
DW 16

SOIC - 2.65 mm max height

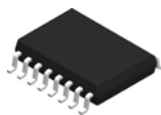
7.5 x 10.3, 1.27 mm pitch

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

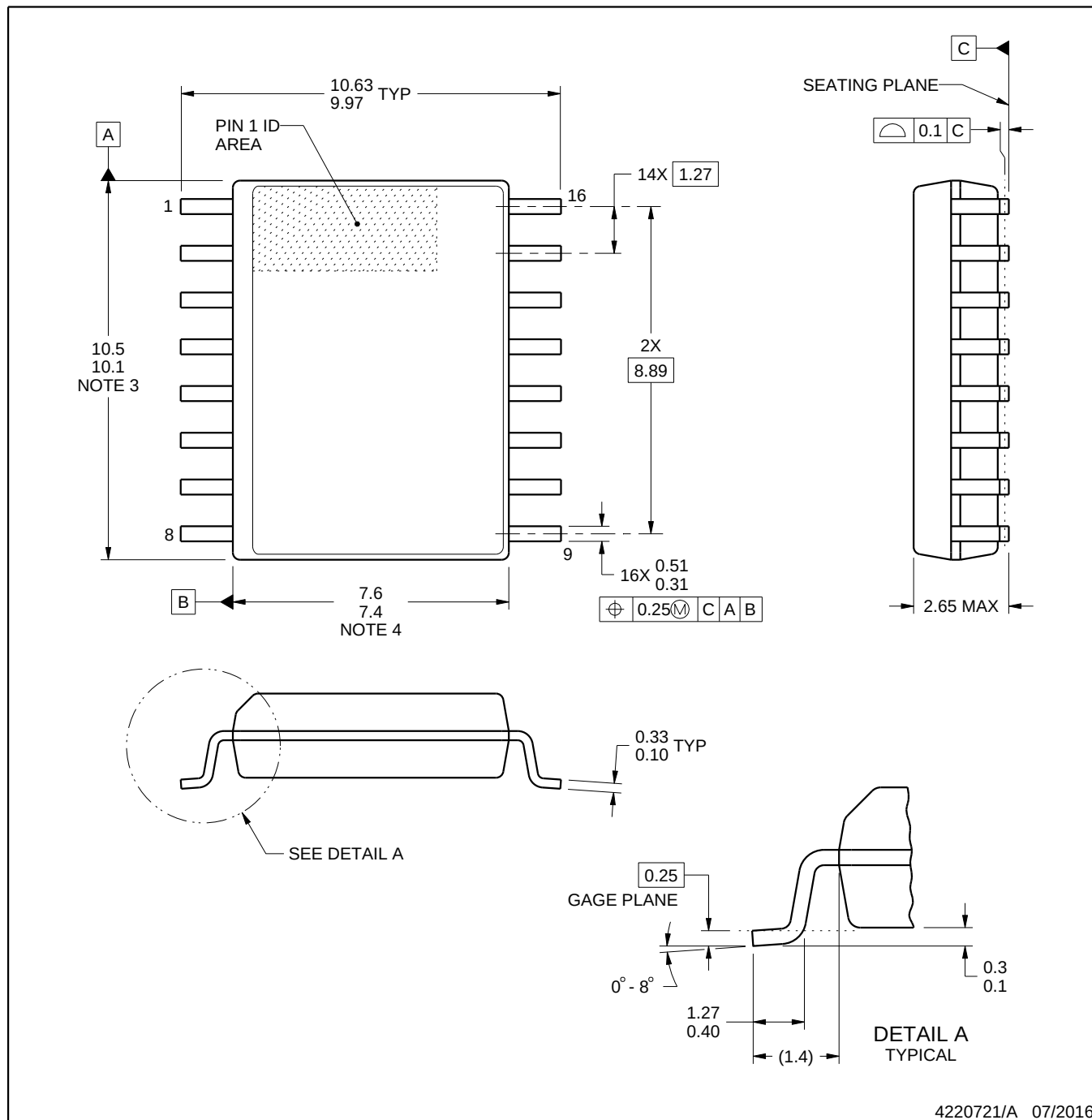


DW0016A

PACKAGE OUTLINE

SOIC - 2.65 mm max height

SOIC



4220721/A 07/2016

NOTES:

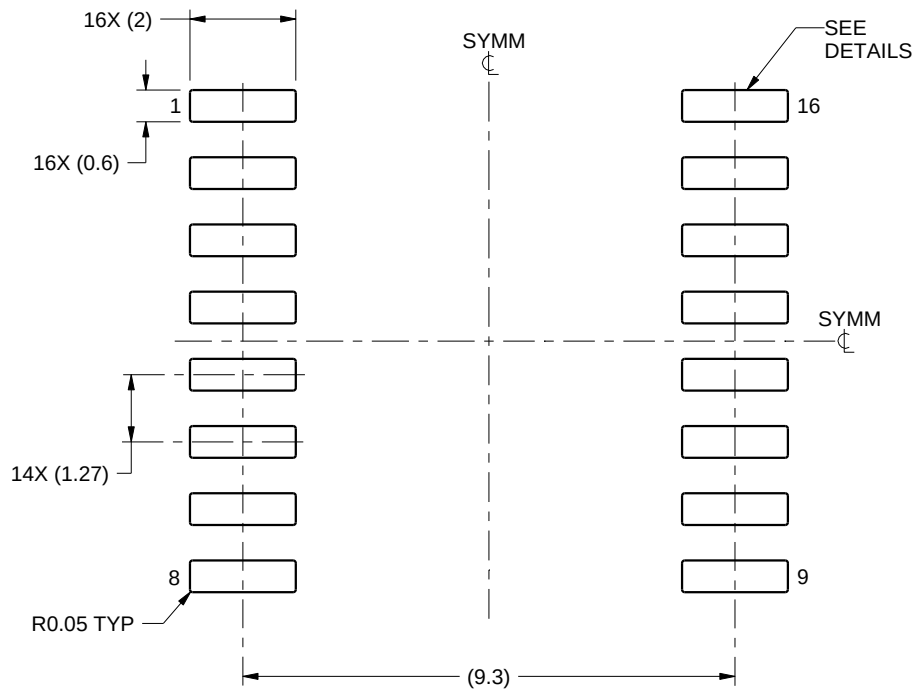
1. All linear dimensions are in millimeters. Dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate 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

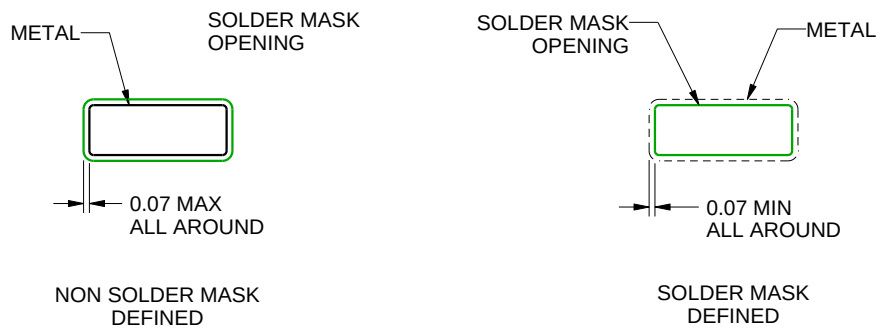
DW0016A

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.

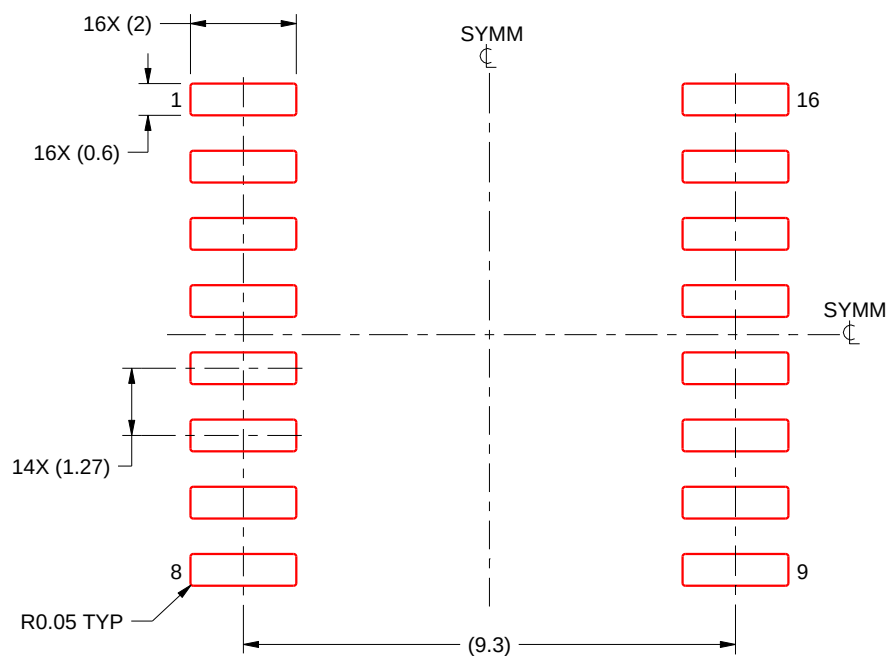
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

EXAMPLE STENCIL DESIGN

DW0016A

SOIC - 2.65 mm max height

SOIC

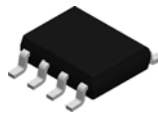


SOLDER PASTE EXAMPLE
BASED ON 0.125 mm THICK STENCIL
SCALE:7X

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.

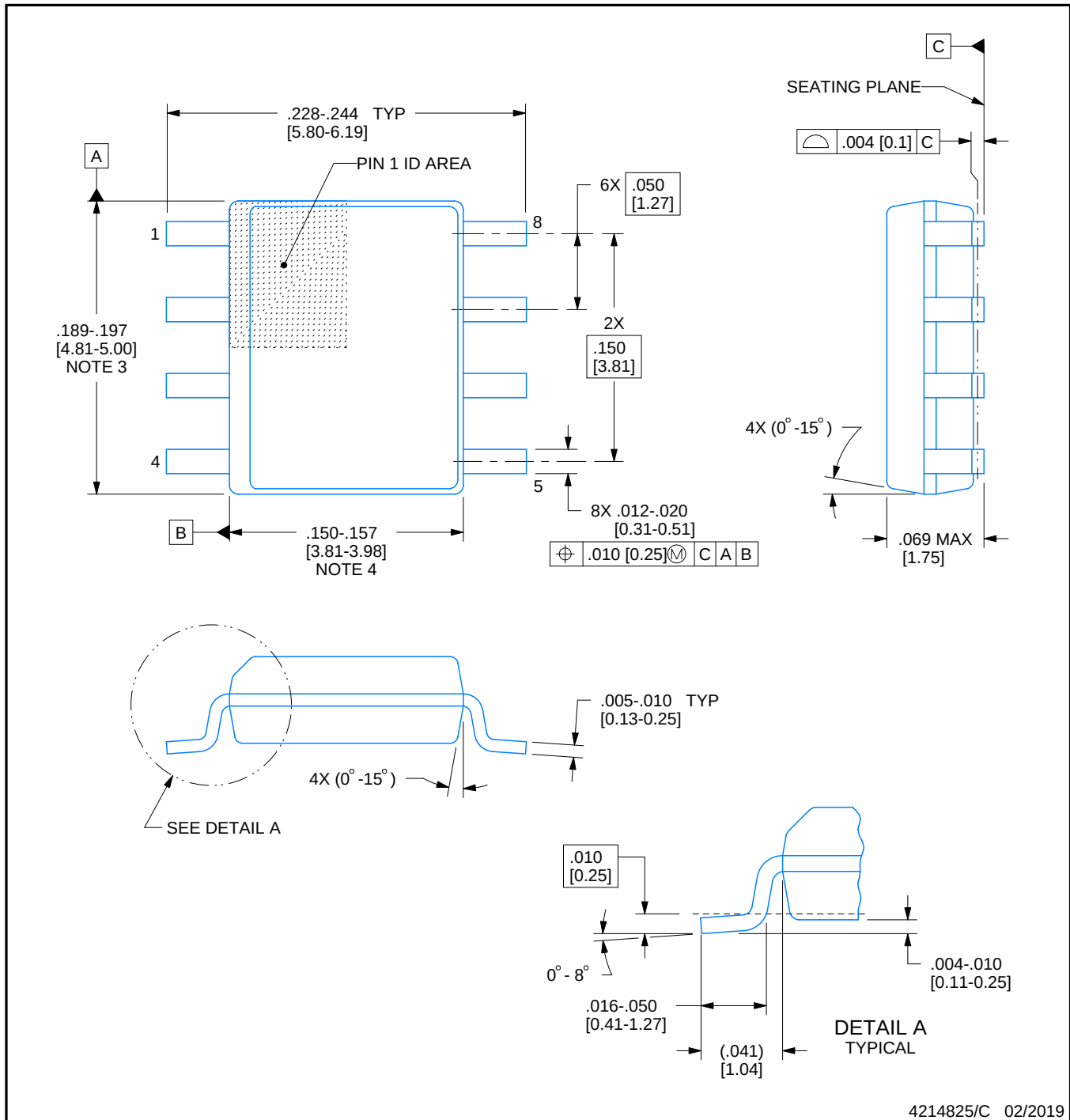


D0008A

PACKAGE OUTLINE

SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT



4214825/C 02/2019

NOTES:

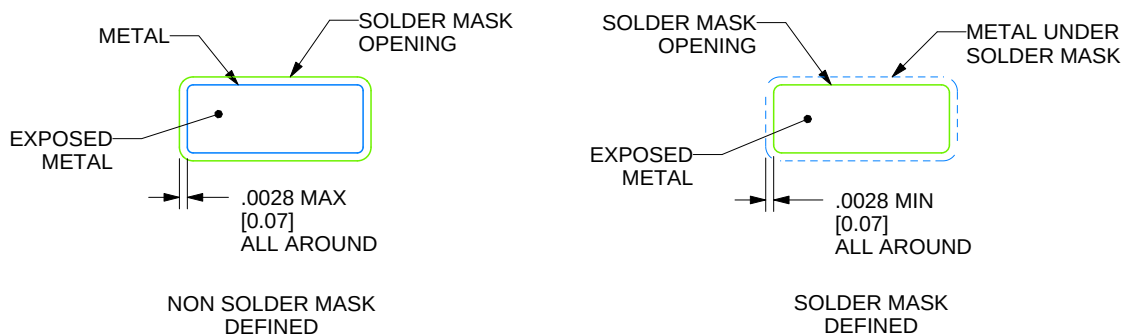
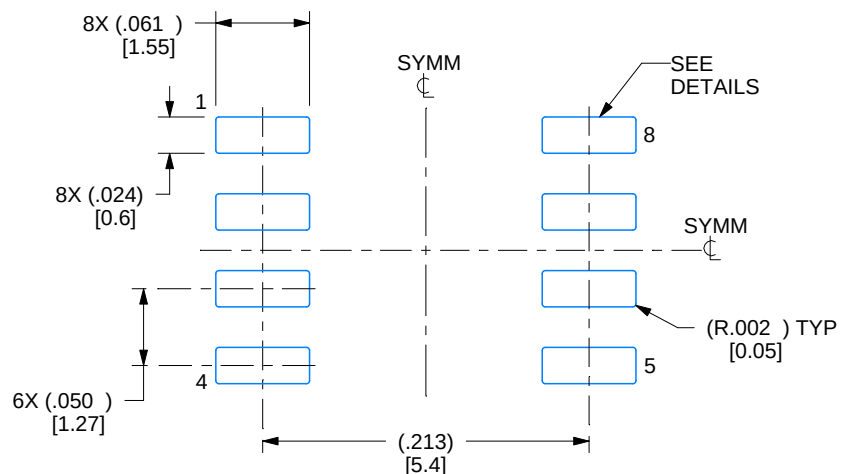
1. Linear dimensions are in inches [millimeters]. Dimensions in parenthesis are for reference only. Controlling dimensions are in inches. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate 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.

EXAMPLE BOARD LAYOUT

D0008A

SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT



SOLDER MASK DETAILS

4214825/C 02/2019

NOTES: (continued)

6. Publication IPC-7351 may have alternate designs.

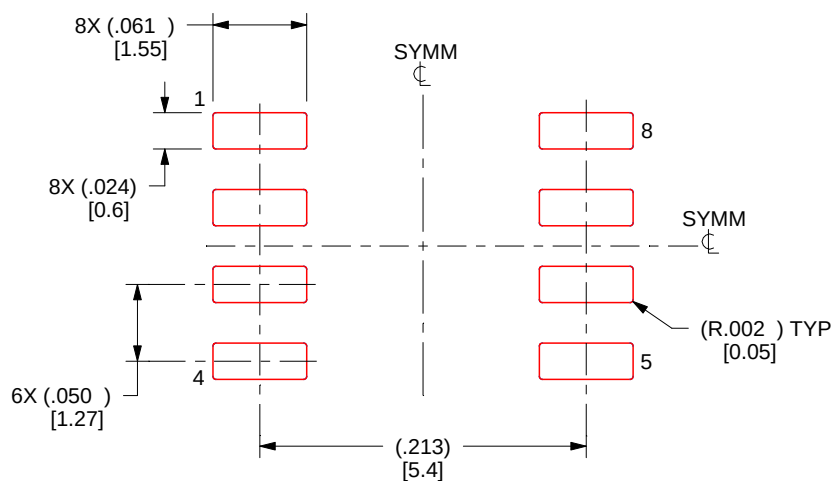
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

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

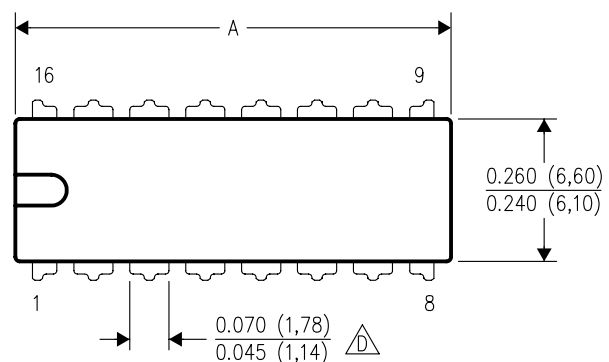
NOTES: (continued)

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.

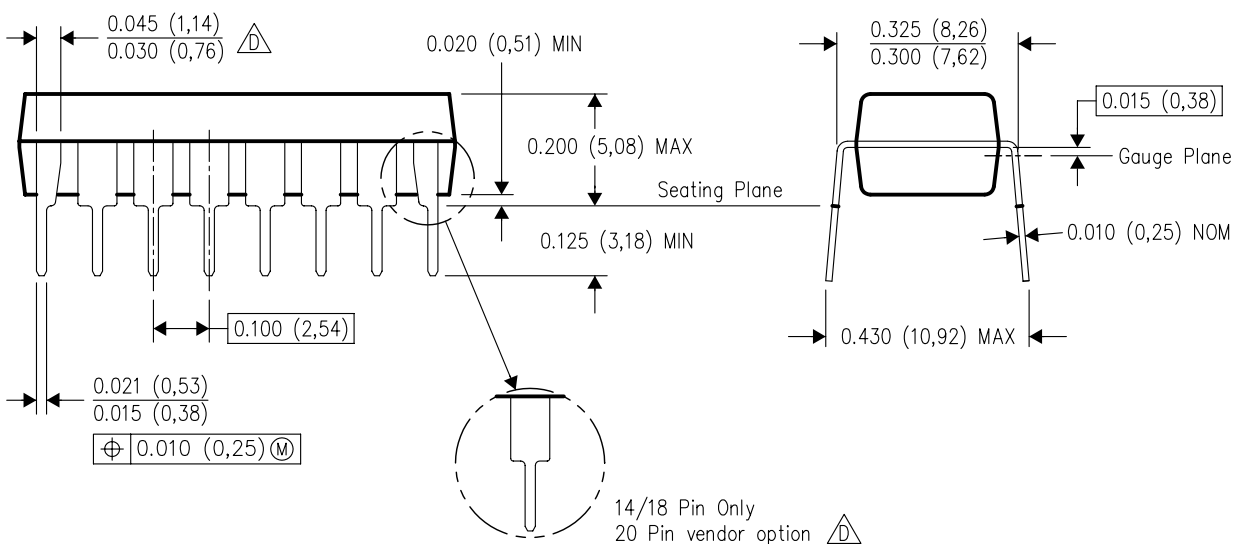
N (R-PDIP-T**)

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.

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