OP07x 高精度オペアンプ

1 特長

- 低ノイズ
- 外付け部品不要
- 低コストでチョッパー・アンプを置き換え
- 幅広い入力電圧範囲:
  0V～±14V (通常は ±15V 電源)
- 幅広い供給電圧範囲:±3V～±18V

2 アプリケーション

- アナログ入力モジュール
- バッテリ試験装置
- 実験室およびフィールド計測
- 温度トランスミッタ
- 商用ネットワークおよびサーバーの PSU (電源)

3 説明

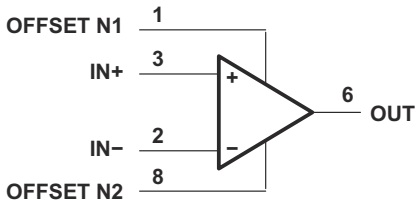
OP07C および OP07D (OP07x) デバイスは、低ノイズ、チョッパーレス、バイポーラ入力トランジスタを特徴とするアンプ回路により、低オフセットと長期安定性を実現します。ほとんどのアプリケーションでは、オフセット・ヌリング周波数補償のための外付け部品は必要ありません。入力電圧範囲が広く、同相信号除去が非常に優れた完全な差動入力により、ノイズの多い環境や非反転アプリケーションで最大の柔軟性と性能を実現します。温度範囲全体にわたって、低いバイアス電流と非常に高い入力インピーダンスが維持されます。

性能の向上と幅広い温度範囲については、低消費電力の次世代 OPA207 と、大きい容量性負荷ドライブ能力を持つ OPA202 をご覧ください。

パッケージ情報

部品番号	パッケージ(1)	本体サイズ (公称)
OP07C、OP07D	D (SOIC、8)	4.90mm × 3.91mm
	P (PDIP、8)	9.81mm × 6.35mm
	PS (SO、8)	6.20mm × 5.30mm

(1) 利用可能なパッケージと OP07 については、このデータシートの末尾にある注文情報を参照してください。



簡略回路図

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4 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 G (November 2014) to Revision H (July 2022) — **Page**

- 「特長」の「幅広い入力電圧範囲」の箇条書き項目に電源条件を追加 ... 1
- Changed VCC_+ to V+ and VCC_- to V− ... 3
- Changed supply voltage abbreviation from VCC+ and VCC– to V_S in *Absolute Maximum Ratings* and throughout the data sheet ... 4
- Changed note 5 in *Absolute Maximum Ratings* to include a note that fast-ramping shorts to the positive supply can damage the device ... 4
- Changed Electrostatic discharge Human-body model and Charged-device model from 1000 V to ±1000 V ... 4
- Added new values to *Thermal Information* ... 4
- Changed *Electrical Characteristics* format ... 5
- Changed parameter name from supply-voltage sensitivity to power supply rejection ratio in *Electrical Characteristics* ... 5
- Changed parameter name from input offset voltage to Input voltage noise density in *Electrical Characteristics* ... 5
- Changed input current noise density unit from nV/√Hz to pA/√Hz in *Electrical Characteristics* ... 5
- Changed parameter name from large-signal differential voltage gain to open-loop voltage gain in *Electrical Characteristics* ... 5
- Changed parameter name from peak output voltage to voltage output swing in Electrical Characteristics ... 5
- Changed functional block diagram ... 8
- Changed text to clarify how to adjust input mismatches using null pins in *Application Information* ... 9

Changes from Revision F (January 2014) to Revision G (November 2014) — **Page**

- 「アプリケーション」セクション、「製品情報」表、「ピン機能」表、「取り扱いに関する定格」表、「熱に関する情報」表、「代表的特性」セクション、「機能説明」セクション、「デバイスの機能モード」セクション、「アプリケーションと実装」セクション、「電源に関する推奨事項」セクション、「レイアウト」セクション、「デバイスおよびドキュメントのサポート」セクション、「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

Changes from Revision E (May 2004) to Revision F (January 2014) — **Page**

- 「注文情報」表を削除 ... 1

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5 Pin Configuration and Functions

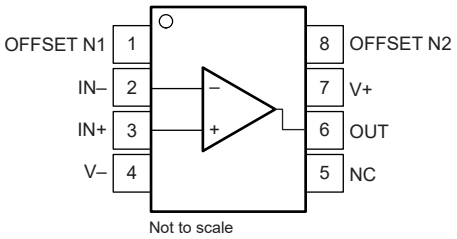


図 5-1. D Package, 8-Pin SOIC, P Package, 8-Pin PDIP, and PS Package, 8-Pin SO (Top View)

表 5-1. Pin Functions

PIN		TYPE	DESCRIPTION
NAME	NO.		
IN+	3	Input	Noninverting input
IN–	2	Input	Inverting input
NC	5	—	Do not connect
OFFSET N1	1	Input	External input offset voltage adjustment
OFFSET N2	8	Input	External input offset voltage adjustment
OUT	6	Output	Output
V+	7	—	Positive supply
V–	4	—	Negative supply

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6 Specifications

6.1 Absolute Maximum Ratings

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

			MIN	MAX	UNIT
V_S	Supply voltage((2))	Single supply		44	V
		Dual supply		±22	
	Input voltage	Differential(3)		±30	V
		Single-ended(4)		±22	
	Output short-circuit(5)		Continous		
T_J	Operating junction temperature		–55	150	°C
T_{stg}	Storage temperature		–65	150	°C

(1) Stresses beyond those listed under *Absolute Maximum Ratings* 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 *Recommended Operating Conditions*. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.
(2) All voltage values, unless otherwise noted, are with respect to the midpoint between V+ and V−.
(3) Differential voltages are at IN+ with respect to IN−.
(4) The magnitude of the input voltage must never exceed the magnitude of the supply voltage or 15 V, whichever is less.
(5) The output can be shorted to ground or to the negative power supply. Fast ramping shorts to the positive supply can cause permanent damage and eventual destruction.

6.2 ESD Ratings

			VALUE	UNIT
$V_{(ESD)}$	Electrostatic discharge	Human-body model (HBM), per ANSI/ESDA/JEDEC JS-001(1)	±1000	V
		Charged-device model (CDM), per JEDEC specification JESD22-C101(2)	±1000	

(1) JEDEC document JEP155 states that 500-V HBM allows safe manufacturing with a standard ESD control process.
(2) JEDEC document JEP157 states that 250-V CDM allows safe manufacturing with a standard ESD control process.

6.3 Recommended Operating Conditions

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

			MIN	NOM	MAX	UNIT
V_S	Supply voltage	Single supply	6		36	V
		Dual supply	±3		±18	
V_{CM}	Common-mode input voltage	V_S = ±15 V	–13		13	V
T_A	Operating ambient temperature		0		70	°C

6.4 Thermal Information

THERMAL METRIC(1)		OP07x		UNIT
		D (SOIC)	P (PDIP)	
		8 PINS	8 PINS	
$R_{\theta JA}$	Junction-to-ambient thermal resistance	127.6	85	°C/W
$R_{\theta JC(top)}$	Junction-to-case (top) thermal resistance	67.1	68.6	°C/W
$R_{\theta JB}$	Junction-to-board thermal resistance	71.4	55..6	°C/W
ψ_{JT}	Junction-to-top characterization parameter	18.7	38.3	°C/W
ψ_{JB}	Junction-to-board characterization parameter	70.6	55.2	°C/W
$R_{\theta JC(bot)}$	Junction-to-case (bottom) thermal resistance	—	—	°C/W

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

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6.5 Electrical Characteristics

at T_A = 25°C, V_S = ±15 V, R_L = 2 kΩ connected to mid-supply, and V_{CM} = V_{OUT} = mid-supply (unless otherwise noted)(1).

PARAMETER		TEST CONDITIONS		MIN	TYP	MAX	UNIT
OFFSET VOLTAGE							
V_{OS}	Input offset voltage	OP07C			±60		µV
			T_A = 0°C to 70°C		±85		
		OP07D				±150	
			T_A = 0°C to 70°C			±250	
dV_{OS}/dT	Input offset voltage drift	T_A = 0°C to 70°C	OP07C		±0.5		µV/°C
			OP07D			±2.5	
	Long-term drift of input offset voltage(2)				±0.4		µV/mo
	Offset adjustment range	R_s = 20 kΩ, see セクション 8.1			±4		mV
PSRR	Power supply rejection ratio	V_S = ±3 V to ±18 V			7	32	µV/V
			T_A = 0°C to 70°C		10	51	
INPUT BIAS CURRENT							
I_B	Input bias current	OP07C			±1.8		nA
			T_A = 0°C to 70°C		±2.2		
		OP07D				±12	
			T_A = 0°C to 70°C			±14	
	Input bias current drift	OP07C			±18		pA/°C
		OP07D				±50	
I_{OS}	Input offset current	OP07C			±0.8		nA
			T_A = 0°C to 70°C		±1.6		
		OP07D				±6	
			T_A = 0°C to 70°C			±8	
	Input offset current drift	OP07C			12		pA/°C
		OP07D				±50	
NOISE							
	Input voltage noise	f = 0.1 Hz to 10 Hz			0.38		$µV_{PP}$
e_N	Input voltage noise density	f = 10 Hz			10.5		$nV/\sqrt{Hz}$
		f = 100 Hz			10.2		
		f = 1 kHz			9.8		
	Input current noise	f = 0.1 Hz to 10 Hz			15		pA_{pp}
i_N	Input current noise density	f = 10 Hz			0.35		$pA/\sqrt{Hz}$
		f = 100 Hz			0.15		
		f = 1 kHz			0.13		
INPUT VOLTAGE RANGE							
V_{CM}	Common-mode voltage			±13	±14		V
		T_A = 0°C to 70°C		±13	±13.5		
CMRR	Common-mode rejection ratio	OP07C V_{CM} = ±13 V		100	120		dB
			T_A = 0°C to 70°C	97	120		
		OP07D V_{CM} = ±13 V		94	110		
			T_A = 0°C to 70°C	94	106		
INPUT CAPACITANCE							
r_I	Input resistance			7	33		MΩ
OPEN-LOOP GAIN							

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6.5 Electrical Characteristics (continued)

at T_A = 25°C, V_S = ±15 V, R_L = 2 kΩ connected to mid-supply, and V_{CM} = V_{OUT} = mid-supply (unless otherwise noted)[1].

PARAMETER		TEST CONDITIONS		MIN	TYP	MAX	UNIT
A_{OL}	Open-loop voltage gain	1.4 V < V_O < 11.4 V, R_L = 500 kΩ	OP07C	100	400		V/mV
			OP07D		400		
		V_O = ±10 V		120	400		
			T_A = –40°C to +125°C	100	400		

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6.5 Electrical Characteristics (continued)

at T_A = 25°C, V_S = ±15 V, R_L = 2 kΩ connected to mid-supply, and V_{CM} = V_{OUT} = mid-supply (unless otherwise noted)(1).

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
FREQUENCY RESPONSE						
	Unity gain bandwidth		0.4	0.6		MHz
SR	Slew rate	V_S = 5 V, R_L = 2 kΩ		0.3		V/µs
OUTPUT						
	Voltage output swing		±11.5	±12.8		V
		T_A = 0°C to 70°C	±11	±12.6		
		R_L = 10 kΩ	±12	±13		
		R_L = 1 kΩ		±12		
POWER SUPPLY						
P_D	Power dissipation	No load		80	150	mW
		V_S = ±3 V, no load		4	8	

(1) The specifications listed in the *Electrical Characteristics* apply to OP07C and OP07D.
(2) Because long-term drift cannot be measured on the individual devices before shipment, this specification is not intended to be a warranty. This specification is an engineering estimate of the averaged trend line of drift versus time over extended periods after the first 30 days of operation.

6.6 Typical Characteristics

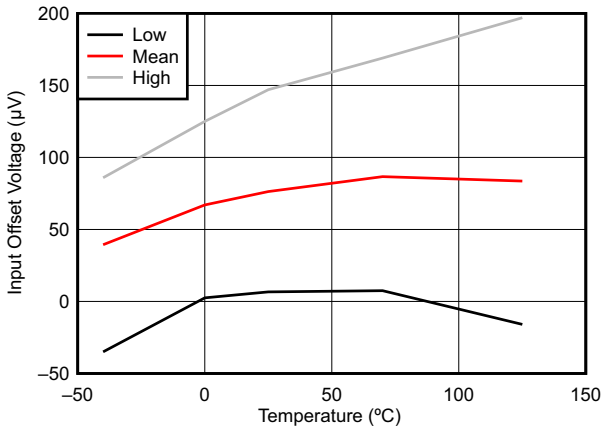


図 6-1. Input-Offset Voltage vs Temperature

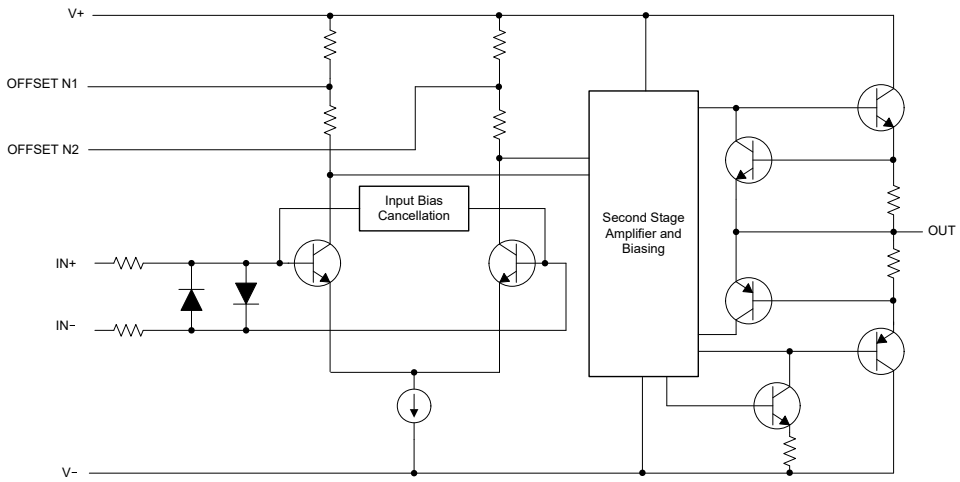
7 Detailed Description

7.1 Overview

These devices offer low offset and long-term stability by means of a low-noise, chopperless, bipolar-input-transistor amplifier circuit. For most applications, external components are not required for offset nulling and frequency compensation. The true differential input, with a wide input-voltage range and outstanding common-mode rejection, provides maximum flexibility and performance in high-noise environments and in noninverting applications. Low bias currents and extremely high input impedances are maintained over the entire temperature range.

These devices are characterized for operation from 0°C to 70°C.

7.2 Functional Block Diagram



7.3 Feature Description

7.3.1 Offset-Voltage Null Capability

The input offset voltage of operational amplifiers (op amps) arises from unavoidable mismatches in the differential input stage of the op-amp circuit caused by mismatched transistor pairs, collector currents, current-gain betas (β), collector or emitter resistors, and so on. The input offset pins allow the designer to adjust for these mismatches by external circuitry. See *セクション 8* for more details on design techniques.

7.3.2 Slew Rate

The slew rate is the rate at which an operational amplifier can change the output when there is a change on the input. The OP07x have a 0.3-V/µs slew rate.

7.4 Device Functional Modes

The OP07x are powered on when the supply is connected. The devices can be operated as single-supply operational amplifiers or dual-supply amplifiers, depending on the application.

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8 Application and Implementation

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8.1 Application Information

The input offset voltage of operational amplifiers (op amps) arises from unavoidable mismatches in the differential input stage of the op-amp circuit caused by mismatched transistor pairs, collector currents, current-gain betas (β), collector or emitter resistors, and so on. The input offset pins allow the designer to adjust for these mismatches with external circuitry. 図 8-1 shows how these input mismatches can be adjusted by putting resistors or a potentiometer between the null pins. Use a potentiometer to fine tune the circuit during testing or for applications that require precision offset control. For more information about designing using the input-offset pins, see the *Nulling Input Offset Voltage of Operational Amplifiers* application report.

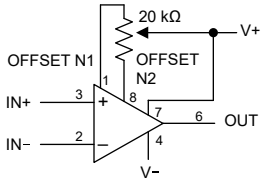


図 8-1. Input Offset-Voltage Null Circuit

8.2 Typical Application

The voltage follower configuration of the operational amplifier is used for applications where a weak signal is used to drive a relatively high current load. This circuit is also called a buffer amplifier or unity gain amplifier. The inputs of an operational amplifier have a very high resistance that puts a negligible current load on the voltage source. The output resistance of the operational amplifier is almost negligible, so the amplifier can provide as much current as necessary to the output load.

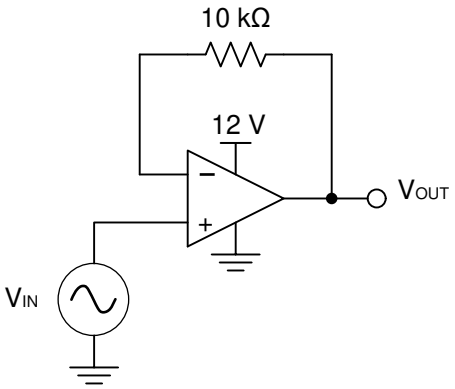


図 8-2. Voltage Follower Schematic

8.2.1 Design Requirements

- Output range of 2 V to 11 V
- Input range of 2 V to 11 V

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8.2.2 Detailed Design Procedure

8.2.2.1 Output Voltage Swing

The output voltage of an operational amplifier is limited by the internal circuitry to some level less than the supply rails. For this amplifier, the output voltage swing is within ±12 V, which accommodates the input and output voltage requirements.

8.2.2.2 Supply and Input Voltage

For correct operation of the amplifier, neither input must be higher than the recommended positive supply rail voltage or lower than the recommended negative supply rail voltage. The chosen amplifier must be able to operate at the supply voltage that accommodates the inputs. Because the input for this application goes up to 11 V, the supply voltage must be 12 V. Using a negative voltage on the lower rail, rather than ground, allows the amplifier to maintain linearity for inputs below 2 V.

8.2.3 Application Curves

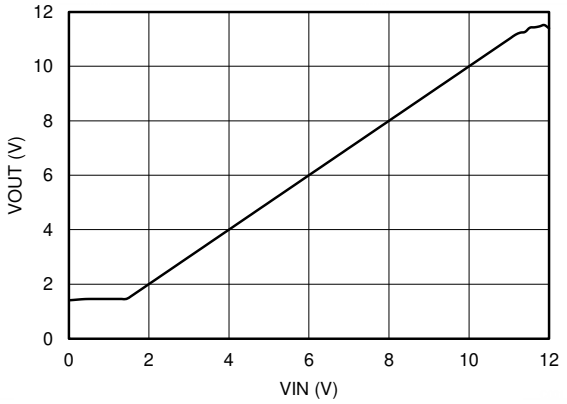


図 8-3. Output Voltage vs Input Voltage

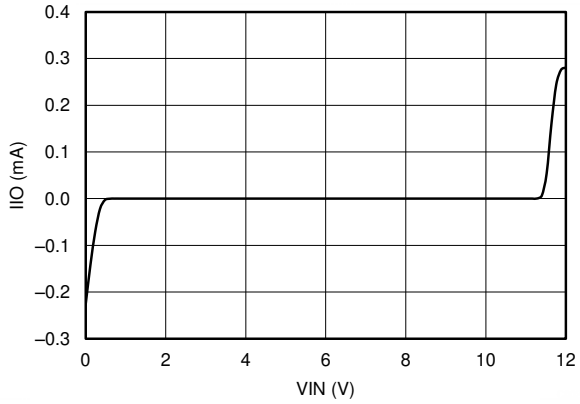


図 8-4. Current Drawn by the Input of the Voltage Follower (I_{IO}) vs Input Voltage

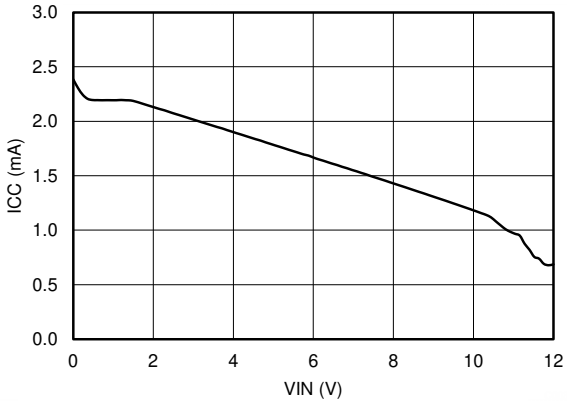


図 8-5. Current Drawn from Supply (I_{CC}) vs Input Voltage

8.3 Power Supply Recommendations

The OP07x operate from ±3 V to ±18 V supplies; many specifications apply from 0°C to 70°C.

> **注意**
>
> Supply voltages larger than ±22 V can permanently damage the device. See also セクション *6.1*.

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Place 0.1-µF bypass capacitors close to the power-supply pins to reduce errors coupling in from noisy or high-impedance power supplies. For more details on bypass capacitor placement, see *セクション 8.4.1*.

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8.4 Layout

8.4.1 Layout Guidelines

For best operational performance of the device, use good PCB layout practices, including:

- Noise can propagate into analog circuitry through the power pins of the circuit as a whole, as well as the operational amplifier. Bypass capacitors are used to reduce the coupled noise by providing low-impedance power sources local to the analog circuitry.
  - Connect low-ESR, 0.1-µF ceramic bypass capacitors between each supply pin and ground, placed as close to the device as possible. A single bypass capacitor from V+ to ground is applicable for single supply applications.
- Separate grounding for analog and digital portions of circuitry is one of the simplest and most-effective methods of noise suppression. On multilayer PCBs, one or more layers are usually devoted to ground planes. A ground plane helps distribute heat and reduces EMI noise pickup. Make sure to physically separate digital and analog grounds, paying attention to the flow of the ground current.
- To reduce parasitic coupling, run the input traces as far away from the supply or output traces as possible. If it is not possible to keep them separate, it is much better to cross the sensitive trace perpendicularly, as opposed to in parallel, with the noisy trace.
- Place the external components as close to the device as possible. Keeping RF and RG close to the inverting input minimizes parasitic capacitance, as shown in *セクション 8.4.2*.
- Keep the length of input traces as short as possible. Always remember that the input traces are the most sensitive part of the circuit.
- Consider a driven, low-impedance guard ring around the critical traces. A guard ring can significantly reduce leakage currents from nearby traces that are at different potentials.

8.4.2 Layout Example

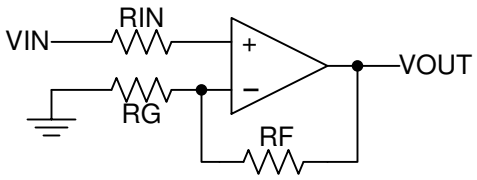


図 8-6. Operational Amplifier Schematic for Noninverting Configuration

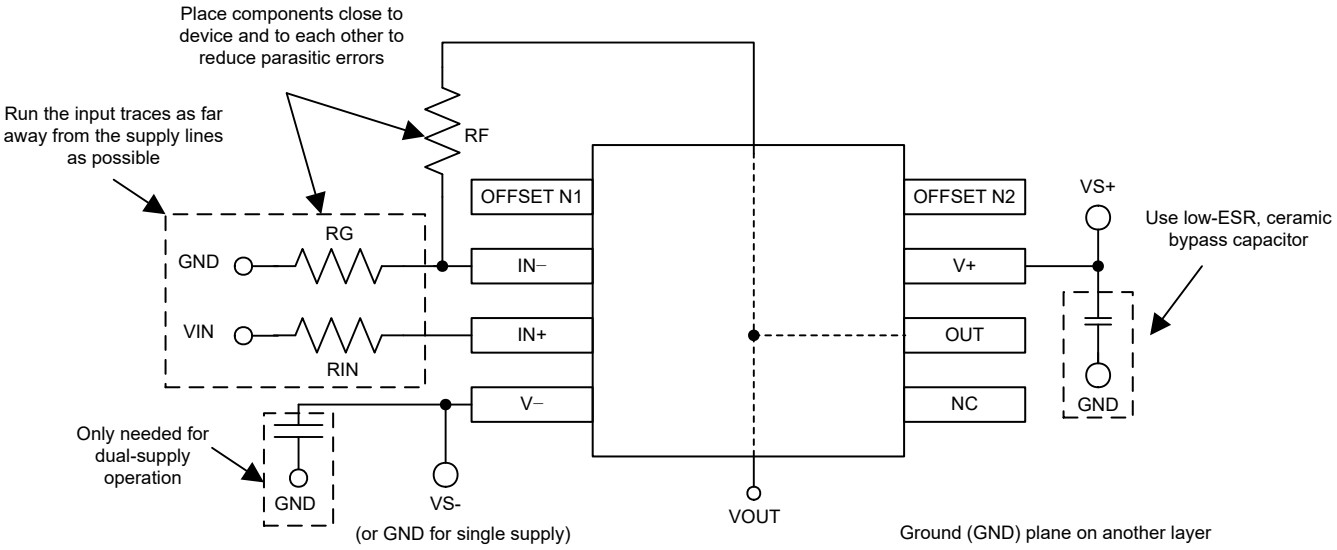


図 8-7. Operational Amplifier Board Layout for Noninverting Configuration

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9 Device and Documentation Support

9.1 ドキュメントの更新通知を受け取る方法

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9.2 サポート・リソース

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9.3 Trademarks

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9.4 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。

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9.5 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。

10 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 Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead finish/ Ball material (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
OP-07DP	LIFEBUY	PDIP	P	8	50	RoHS & Green	NIPDAU	N / A for Pkg Type	0 to 70	OP-07DP	
OP-07DPS	LIFEBUY	SO	PS	8	80	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	0 to 70	OP-07D	
OP-07DPSR	ACTIVE	SO	PS	8	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	0 to 70	OP-07D	Samples
OP07-W	ACTIVE	WAFERSALE	YS	0	3603	TBD	Call TI	Call TI			Samples
OP07CD	LIFEBUY	SOIC	D	8	75	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	0 to 70	OP07C	
OP07CDE4	LIFEBUY	SOIC	D	8	75	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	0 to 70	OP07C	
OP07CDG4	LIFEBUY	SOIC	D	8	75	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	0 to 70	OP07C	
OP07CDR	ACTIVE	SOIC	D	8	2500	RoHS & Green	NIPDAU | SN	Level-1-260C-UNLIM	0 to 70	OP07C	Samples
OP07CDRE4	LIFEBUY	SOIC	D	8	2500	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	0 to 70	OP07C	
OP07CDRG4	LIFEBUY	SOIC	D	8	2500	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	0 to 70	OP07C	
OP07CP	ACTIVE	PDIP	P	8	50	RoHS & Green	NIPDAU	N / A for Pkg Type	0 to 70	OP07CP	Samples
OP07DD	ACTIVE	SOIC	D	8	75	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	0 to 70	OP07D	Samples
OP07DDR	ACTIVE	SOIC	D	8	2500	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	0 to 70	OP07D	Samples
OP07DP	LIFEBUY	PDIP	P	8	50	RoHS & Green	NIPDAU	N / A for Pkg Type	0 to 70	OP07DP	
OP07DPE4	LIFEBUY	PDIP	P	8	50	RoHS & Green	NIPDAU	N / A for Pkg Type	0 to 70	OP07DP	

(1) The marketing status values are defined as follows:
ACTIVE: Product device recommended for new designs.
LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.
NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.
PREVIEW: Device has been announced but is not in production. Samples may or may not be available.
OBSOLETE: TI has discontinued the production of the device.

(2) **RoHS:** TI defines "RoHS" to mean semiconductor products that are compliant with the current EU RoHS requirements for all 10 RoHS substances, including the requirement that RoHS substance do not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, "RoHS" products are suitable for use in specified lead-free processes. TI may reference these types of products as "Pb-Free".
RoHS Exempt: TI defines "RoHS Exempt" to mean products that contain lead but are compliant with EU RoHS pursuant to a specific EU RoHS exemption.
Green: TI defines "Green" to mean the content of Chlorine (Cl) and Bromine (Br) based flame retardants meet JS709B low halogen requirements of <=1000ppm threshold. Antimony trioxide based flame retardants must also meet the <=1000ppm threshold requirement.

(3) MSL, Peak Temp. - The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

(4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

(5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

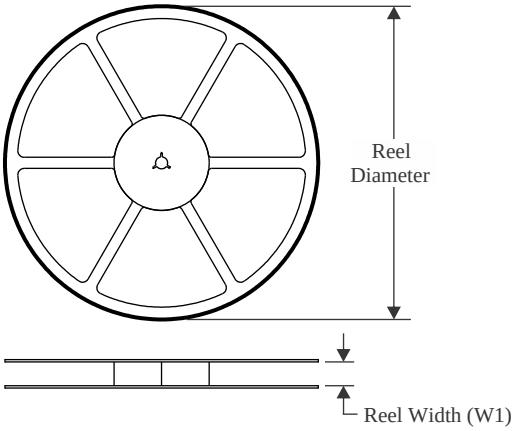
(6) Lead finish/Ball material - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

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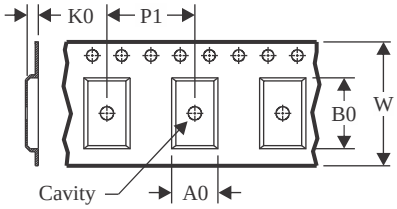
In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

TAPE AND REEL INFORMATION

REEL DIMENSIONS

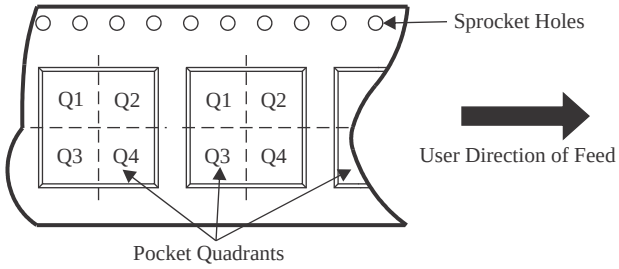


TAPE DIMENSIONS



A0	Dimension designed to accommodate the component width
B0	Dimension designed to accommodate the component length
K0	Dimension designed to accommodate the component thickness
W	Overall width of the carrier tape
P1	Pitch between successive cavity centers

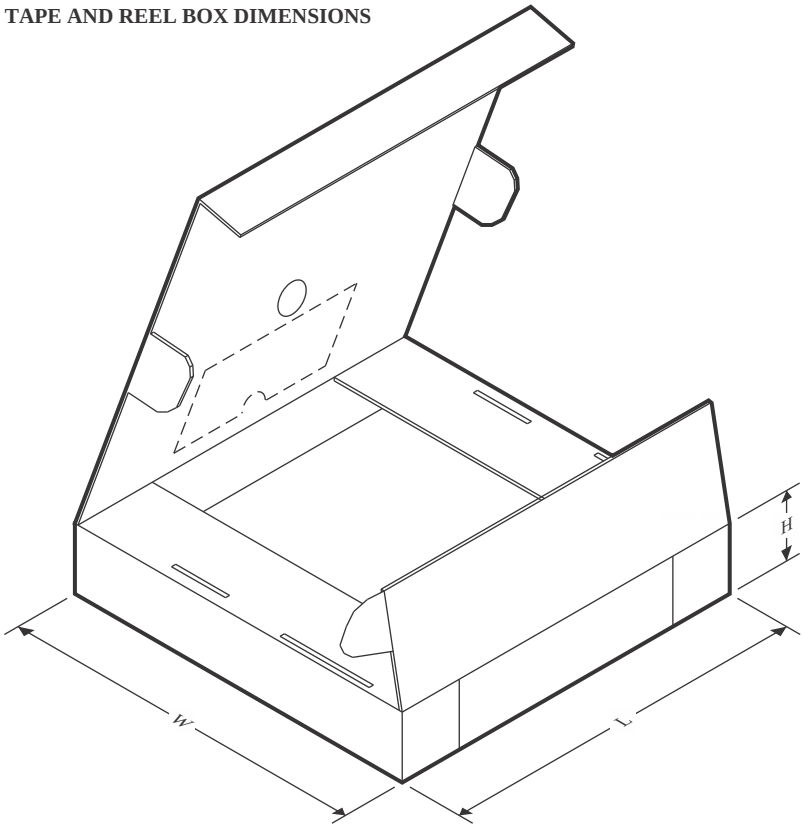
QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*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
OP-07DPSR	SO	PS	8	2000	330.0	16.4	8.35	6.6	2.4	12.0	16.0	Q1
OP07CDR	SOIC	D	8	2500	330.0	12.4	6.4	5.2	2.1	8.0	12.0	Q1
OP07CDR	SOIC	D	8	2500	330.0	12.4	6.4	5.2	2.1	8.0	12.0	Q1
OP07CDR	SOIC	D	8	2500	330.0	12.4	6.4	5.2	2.1	8.0	12.0	Q1
OP07CDR	SOIC	D	8	2500	330.0	12.4	6.4	5.2	2.1	8.0	12.0	Q1
OP07CDRG4	SOIC	D	8	2500	330.0	12.4	6.4	5.2	2.1	8.0	12.0	Q1
OP07DDR	SOIC	D	8	2500	330.0	12.4	6.4	5.2	2.1	8.0	12.0	Q1

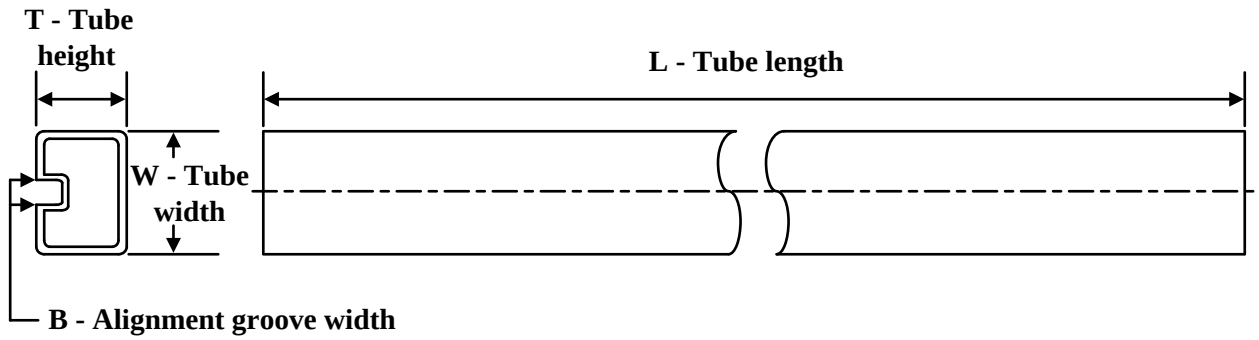
TAPE AND REEL BOX DIMENSIONS



*All dimensions are nominal

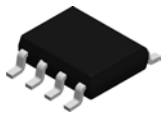
Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
OP-07DPSR	SO	PS	8	2000	356.0	356.0	35.0
OP07CDR	SOIC	D	8	2500	353.0	353.0	32.0
OP07CDR	SOIC	D	8	2500	340.5	338.1	20.6
OP07CDR	SOIC	D	8	2500	356.0	356.0	35.0
OP07CDR	SOIC	D	8	2500	340.5	338.1	20.6
OP07CDRG4	SOIC	D	8	2500	340.5	338.1	20.6
OP07DDR	SOIC	D	8	2500	340.5	338.1	20.6

TUBE



*All dimensions are nominal

Device	Package Name	Package Type	Pins	SPQ	L (mm)	W (mm)	T (µm)	B (mm)
OP-07DP	P	PDIP	8	50	506	13.97	11230	4.32
OP-07DPS	PS	SOP	8	80	530	10.5	4000	4.1
OP07CD	D	SOIC	8	75	507	8	3940	4.32
OP07CDE4	D	SOIC	8	75	507	8	3940	4.32
OP07CDG4	D	SOIC	8	75	507	8	3940	4.32
OP07CP	P	PDIP	8	50	506	13.97	11230	4.32
OP07DD	D	SOIC	8	75	507	8	3940	4.32
OP07DP	P	PDIP	8	50	506	13.97	11230	4.32
OP07DPE4	P	PDIP	8	50	506	13.97	11230	4.32

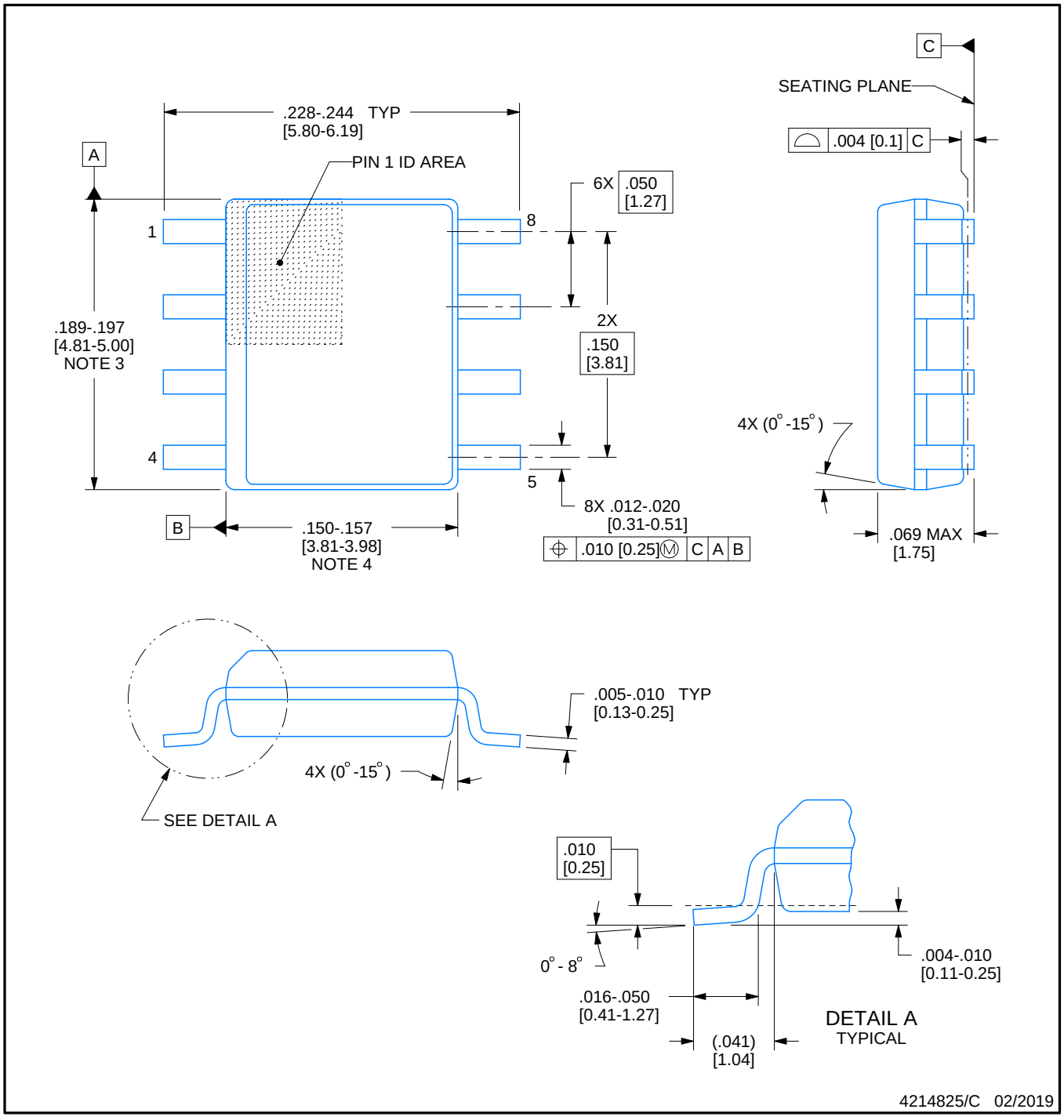


PACKAGE OUTLINE

D0008A

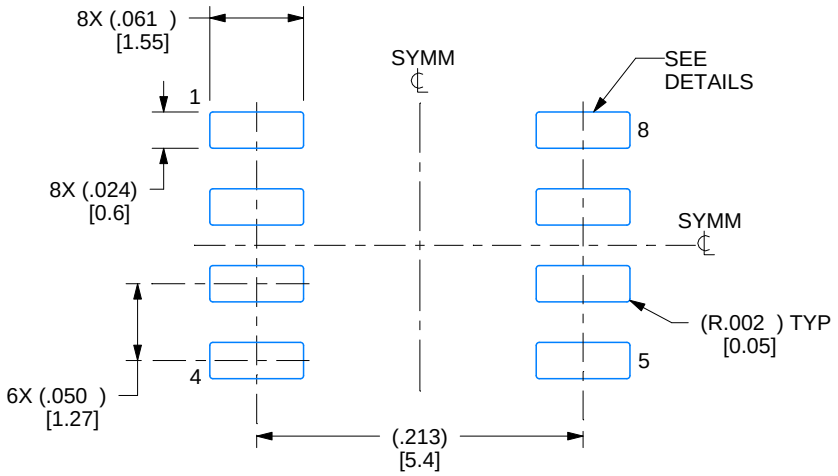
SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT

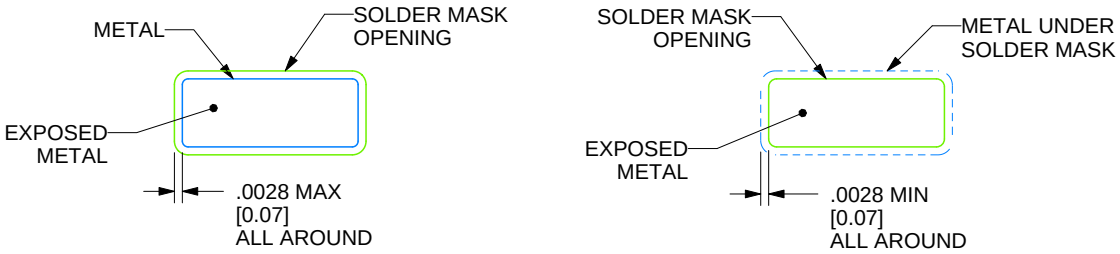


NOTES:

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.



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE:8X



SOLDER MASK DETAILS

4214825/C 02/2019

NOTES: (continued)

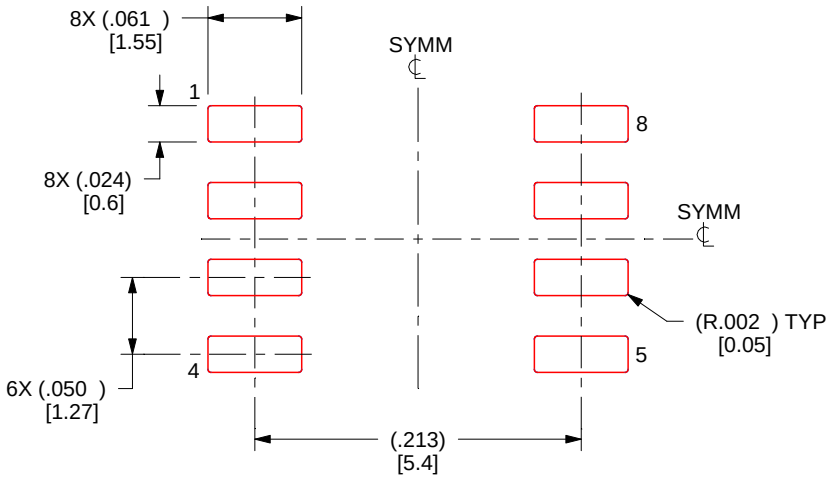
6. Publication IPC-7351 may have alternate designs.
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

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

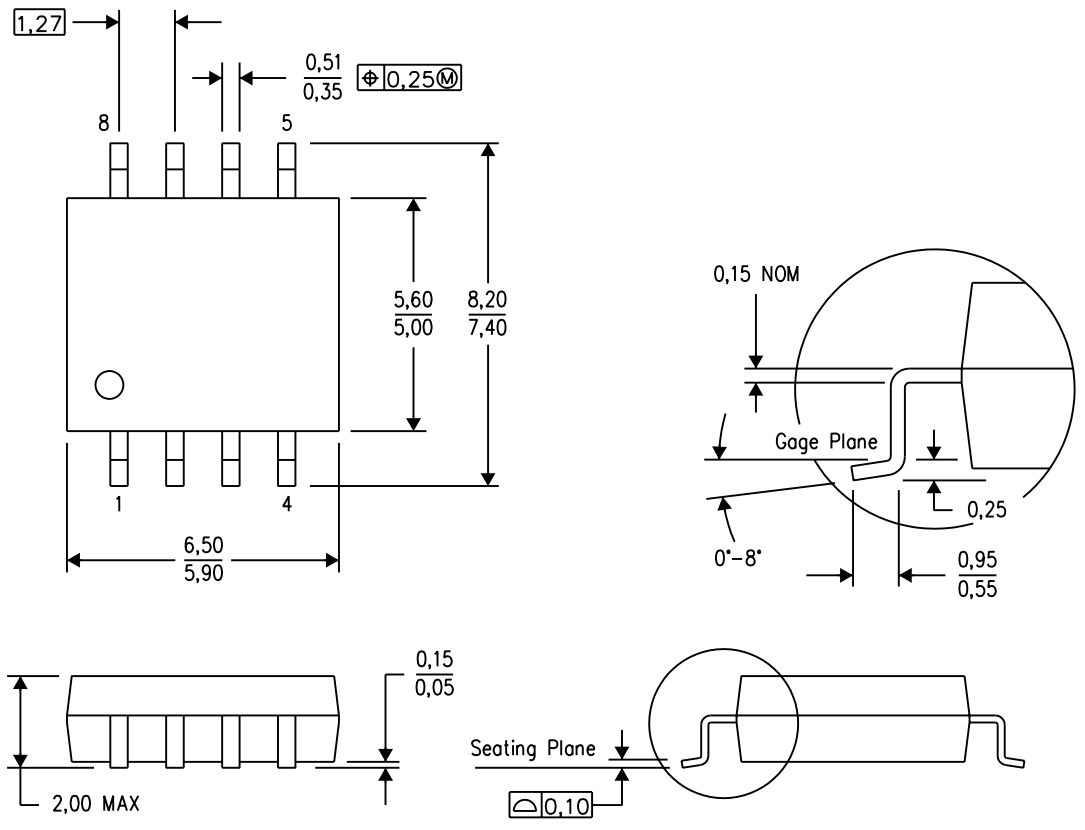
4214825/C 02/2019

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.

MECHANICAL DATA

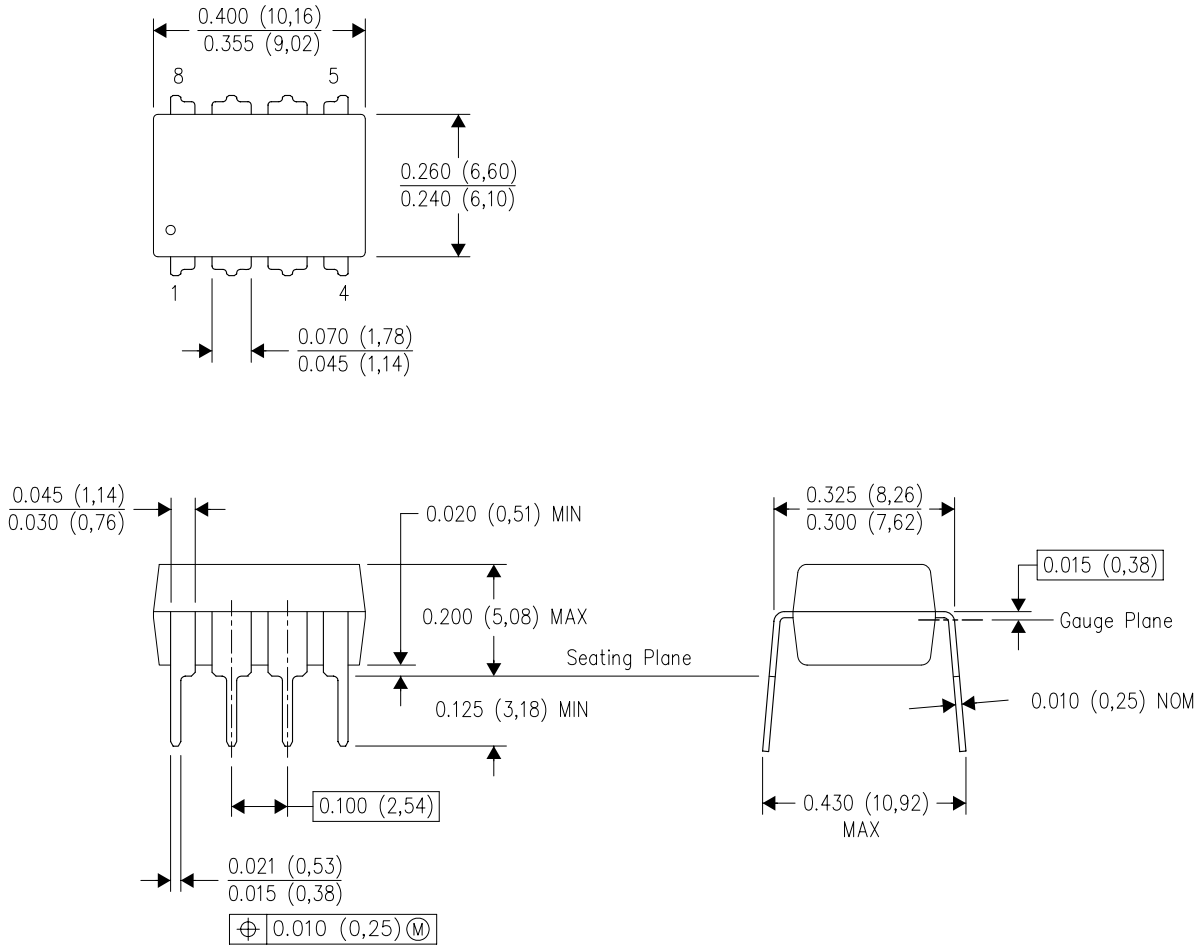
PS (R-PDSO-G8) **PLASTIC SMALL-OUTLINE PACKAGE**



4040063/C 03/03

NOTES:
A. All linear dimensions are in millimeters.
B. This drawing is subject to change without notice.
C. Body dimensions do not include mold flash or protrusion, not to exceed 0,15.

P (R–PDIP–T8) PLASTIC DUAL–IN–LINE PACKAGE



NOTES:
A. All linear dimensions are in inches (millimeters).
B. This drawing is subject to change without notice.
C. Falls within JEDEC MS–001 variation BA.

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