SNx4AHCT86 クワッド、2 入力排他 OR (EXOR) ゲート

1 特長

- 入力は TTL 電圧互換
- JESD 17 準拠で 250mA 超のラッチアップ性能
- MIL-PRF-38535 準拠の製品については、特に記述のない限り、すべてのパラメータはテスト済みです。
  その他のすべての製品については、量産プロセスにすべてのパラメータのテストが含まれているとは限りません。
- JESD 22 を超える ESD 保護
  - 2000V、人体モデル (A114-A)
  - 200V、マシン・モデル (A115-A)

2 アプリケーション

- サーバー
- PC およびノートパソコン
- ネットワーク・スイッチ
- ウェアラブルなヘルスケア / フィットネス機器
- テレコム・インフラストラクチャ
- レジ用電子機器

3 概要

SNx4AHCT86 デバイスは、クワッド 2 入力排他 OR ゲートです。これらのデバイスは、ブール関数 Y = A × B または Y = $\overline{A}$B + A$\overline{B}$ を正論理で実行します。

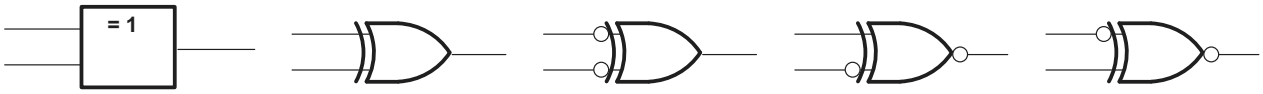
パッケージ情報 (1)

部品番号	パッケージ	本体サイズ (公称)
SN54AHCT86	J (CDIP、14)	19.56mm × 6.67mm
	W (CFP、14)	13.09mm × 6.92mm
	FK (LCCC、20)	8.89mm × 8.89mm
SN74AHCT86	N (PDIP、14)	19.3mm × 6.35mm
	D (SOIC、14)	8.65mm × 3.91mm
	NS (SOP、14)	10.30mm × 5.30mm
	DB (SSOP、14)	6.20mm × 5.30mm
	PW (TSSOP、14)	5.00mm × 4.40mm
	DGV (TVSOP、14)	3.60mm × 4.40mm
	RGY (VQFN、14)	3.50mm × 3.50mm
	BQA (WQFN、14)	3.00mm × 2.50mm

(1) 利用可能なパッケージについては、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。

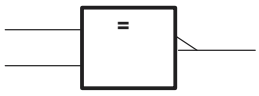
An exclusive-OR gate has many applications, some of which can be represented better by alternative logic symbols.

EXCLUSIVE OR



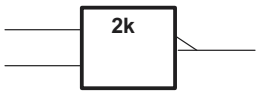
These are five equivalent exclusive-OR symbols valid for an SN74AHCT86 gate in positive logic; negation may be shown at any two ports.

LOGIC-IDENTITY ELEMENT



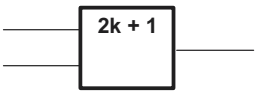
The output is active (low) if all inputs stand at the same logic level (that is, A = B).

EVEN-PARITY ELEMENT



The output is active (low) if an even number of inputs (that is, 0 or 2) are active.

ODD-PARITY ELEMENT



The output is active (high) if an odd number of inputs (that is, only 1 of the 2) are active.

概略回路図

Table of Contents

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 O (May 2023) to Revision P (October 2023)	Page
• Updated RθJA values: D = 97.5 to 124.5, PW = 125.1 to 147.7; Updated D and PW packages for RθJC(top), RθJB, ΨJT, ΨJB, and RθJC(bot), all values in °C/W	6

Changes from Revision N (August 2014) to Revision O (May 2023)	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
• 「パッケージ情報」表を更新	1
• データシートに BQA パッケージを追加	1

5 Pin Configuration and Functions

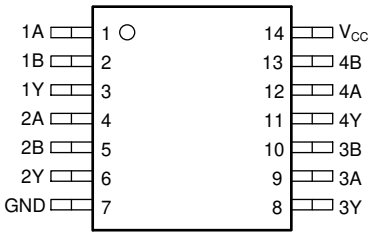


図 5-1. SN54AHCT86 J or W Package, 14-Pin (Top View)
SN74AHCT86 D, DB, DGV, N, NS, or PW Package, 14-Pin (Top View)

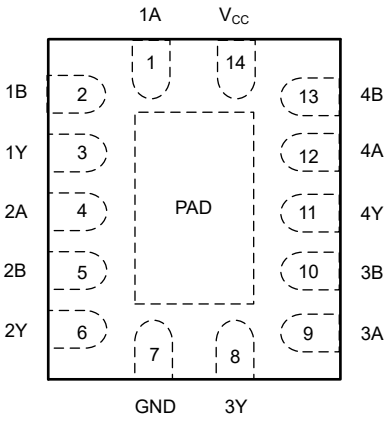


図 5-2. SN74AHCT86 RGY or BQA Package, 14-Pin (Top View)

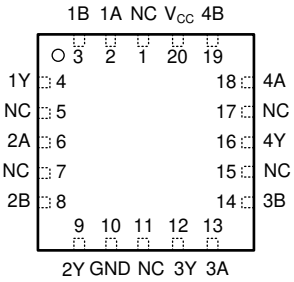


図 5-3. SN54AHCT86 FK Package, 20-Pin (Top View)

表 5-1. Pin Functions

PIN					TYPE[1]	DESCRIPTION
NAME	SN74AHCT86		SN54AHCT86			
	D, DB, DGV, N, NS, PW	RGY, BQA	J, W	FK		
1A	1	1	1	2	I	1A Input
1B	2	2	2	3	I	1B Input
1Y	3	3	3	4	O	1Y Output
2A	4	4	4	6	I	2A Input
2B	5	5	5	8	I	2B Input
2Y	6	6	6	9	O	2Y Output
3Y	8	8	8	12	O	3Y Output
3A	9	9	9	13	I	3A Input
3B	10	10	10	14	I	3B Input
4Y	11	11	11	16	O	4Y Output
4A	12	12	12	18	I	4A Input
4B	13	13	13	19	I	4B Input
GND	7	7	7	10	—	Ground Pin
NC	—	—	—	1, 5, 7, 11, 15, 17	—	No Connection
V_{CC}	14	14	14	20	—	Power Pin

表 5-1. Pin Functions (続き)

PIN					TYPE[1]	DESCRIPTION
NAME	SN74AHCT86		SN54AHCT86			
	D, DB, DGV, N, NS, PW	RGY, BQA	J, W	FK		
Thermal Pad	—	PAD	—	—	—	Thermal Pad

(1) I = input, O = output

6 Specifications

6.1 Absolute Maximum Ratings

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

			MIN	MAX	UNIT
V_{CC}	Supply voltage range		–0.5	7	V
V_I	Input voltage range(2)		–0.5	7	V
V_O	Output voltage range(2)		–0.5	V_{CC} + 0.5	V
I_{IK}	Input clamp current	V_I < 0		–20	mA
I_{OK}	Output clamp current	V_O < 0 or V_O > V_{CC}		±20	mA
I_O	Continuous output current	V_O = 0 to V_{CC}		±25	mA
	Continuous current through V_{CC} or GND			±50	mA

(1) Stresses beyond those listed under *Absolute Maximum Ratings* may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under *Recommended Operating Conditions* is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.
(2) The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

6.2 ESD Ratings

			MIN	MAX	UNIT
T_{stg}	Storage temperature range		–65	150	°C
$V_{(ESD)}$	Electrostatic discharge	Human body model (HBM), per ANSI/ESDA/JEDEC JS-001, all pins(1)	0	2000	V
		Charged device model (CDM), per ANSI/ESDA/JEDEC JS-002, all pins(2)	0	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)(1)

		SN54AHCT86		SN74AHCT86		UNIT
		MIN	MAX	MIN	MAX	
V_{CC}	Supply voltage	4.5	5.5	4.5	5.5	V
V_{IH}	High-level input voltage	2		2		V
V_{IL}	Low-level input voltage		0.8		0.8	V
V_I	Input voltage	0	5.5	0	5.5	V
V_O	Output voltage	0	V_{CC}	0	V_{CC}	V
I_{OH}	High-level output current		–8		–8	mA
I_{OL}	Low-level output current		8		8	mA
$\Delta t/\Delta v$	Input transition rise or fall rate		20		20	ns/V
T_A	Operating free-air temperature	–55	125	–40	125	°C

(1) All unused inputs of the device must be held at V_{CC} or GND to ensure proper device operation. Refer to the TI application report, *Implications of Slow or Floating CMOS Inputs* (SCBA004).

6.4 Thermal Information

THERMAL METRIC(1)		SNx4AHCT86								UNIT
		D	DB	DGV	N	NS	PW	RGY	BQA	
		14 PINS								
$R_{\theta JA}$	Junction-to-ambient thermal resistance	124.5	109.5	133.3	59.7	92.2	147.7	59.0	88.3	°C/W
$R_{\theta JC(top)}$	Junction-to-case (top) thermal resistance	78.8	62.1	55.6	47.3	49.8	77.4	72.5	90.9	
$R_{\theta JB}$	Junction-to-board thermal resistance	81	56.9	66.3	39.5	51.0	90.9	35.0	56.8	
ψ_{JT}	Junction-to-top characterization parameter	37	22.6	7.8	32.4	15.7	27.2	3.9	9.9	
ψ_{JB}	Junction-to-board characterization parameter	80.6	56.3	56.6	39.4	50.6	90.2	35.1	56.7	
$R_{\theta JC(bot)}$	Junction-to-case (bottom) thermal resistance	N/A	N/A	N/A	N/A	N/A	N/A	15.4	33.4	

(1) For more information about traditional and new thermal metrics, see the *IC Package Thermal Metrics* application report (SPRA953).

6.5 Electrical Characteristics

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

PARAMETER	TEST CONDITIONS	V_{CC}	T_A = 25°C			SN54AHCT86		–40°C to 85°C SN74AHCT86		–40°C to 125°C SN74AHCT86		UNIT
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	MIN	MAX	
V_{OH}	I_{OH} = −50 µA	4.5 V	4.4	4.5		4.4		4.4		4.4		V
	I_{OH} = −8 mA		3.94			3.8		3.8		3.8		
V_{OL}	I_{OL} = 50 µA	4.5 V			0.1		0.1		0.1		0.1	V
	I_{OL} = 8 mA				0.36		0.44		0.44		0.44	
I_I	V_I = 5.5 V or GND	0 V to 5.5 V			±0.1		±1(1)		±1		±1	µA
I_{CC}	V_I = V_{CC} or GND, I_O = 0	5.5 V			2		20		20		20	µA
ΔI_{CC} (2)	One input at 3.4 V, Other inputs at V_{CC} or GND	5.5 V			1.35		1.5		1.5		1.5	mA
C_i	V_I = V_{CC} or GND	5 V		4	10				10			pF

(1) On products compliant to MIL-PRF-38535, this parameter is not production tested at V_{CC} = 0 V.
(2) This is the increase in supply current for each input at one of the specified TTL voltage levels, rather than 0 V or V_{CC}.

6.6 Switching Characteristics

over recommended operating free-air temperature range, V_{CC} = 5 V ± 0.5 V (unless otherwise noted) (see 図 7-1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	LOAD CAPACITANCE	T_A = 25°C			–55°C to 125°C SN54AHCT86		–40°C to 85°C SN74AHCT86		–40°C to 125°C SN74AHCT86		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	MIN	MAX	
t_{PLH}	A or B	Y	C_L = 15 pF		5(1)	6.9(1)	1(1)	8(1)	1	8	1	9	ns
t_{PHL}					5(1)	6.9(1)	1(1)	8(1)	1	8	1	9	
t_{PLH}	A or B	Y	C_L = 50 pF		5.5	8.8	1	10	1	9	1	11	ns
t_{PHL}					5.5	8.8	1	10	1	9	1	11	

(1) On products compliant to MIL-PRF-38535, this parameter is not production tested.

6.7 Noise Characteristics

V_{CC} = 5 V, C_L = 50 pF, T_A = 25°C(1)

PARAMETER		SN74AHCT86			UNIT
		MIN	TYP	MAX	
$V_{OL(P)}$	Quiet output, maximum dynamic V_{OL}		0.4	0.8	V
$V_{OL(V)}$	Quiet output, minimum dynamic V_{OL}		–0.4	–0.8	V
$V_{OH(V)}$	Quiet output, minimum dynamic V_{OH}	4.4			V
$V_{IH(D)}$	High-level dynamic input voltage	2			V
$V_{IL(D)}$	Low-level dynamic input voltage			0.8	V

(1) Characteristics are for surface-mount packages only.

6.8 Operating Characteristics

V_{CC} = 5 V, T_A = 25°C

PARAMETER		TEST CONDITIONS		TYP	UNIT
C_{pd}	Power dissipation capacitance	No load,	f = 1 MHz	18	pF

6.9 Typical Characteristics

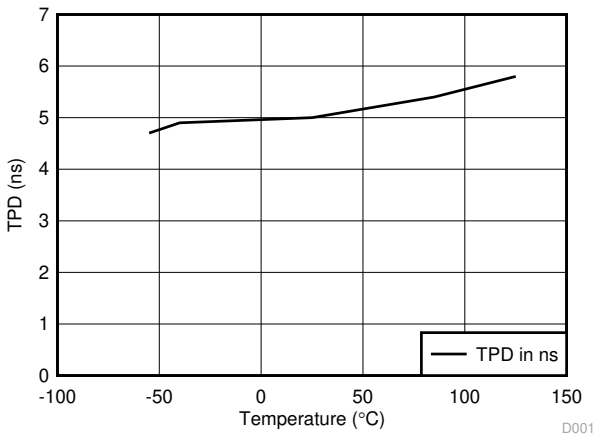
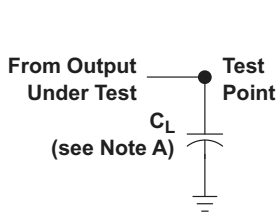
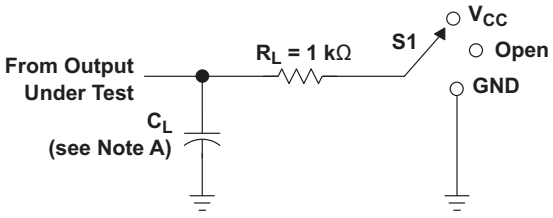


図 6-1. TPD vs Temperature

7 Parameter Measurement Information

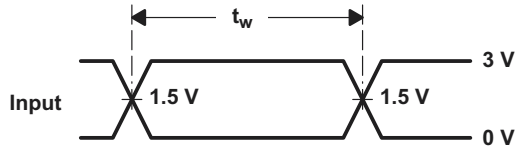


LOAD CIRCUIT FOR
TOTEM-POLE OUTPUTS

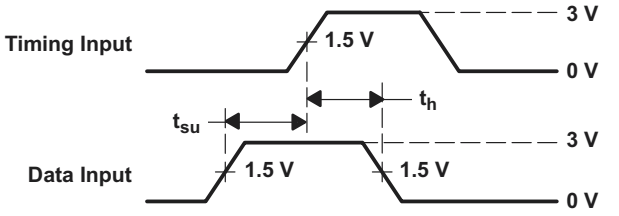


TEST	S1
t_{PLH}/t_{PHL}	Open
t_{PLZ}/t_{PZL}	V_{CC}
t_{PHZ}/t_{PZH}	GND
Open Drain	V_{CC}

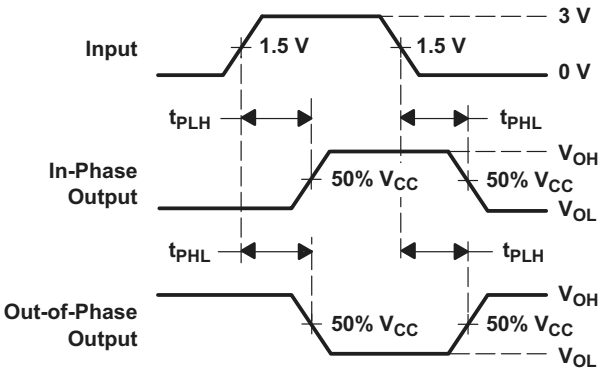
LOAD CIRCUIT FOR
3-STATE AND OPEN-DRAIN OUTPUTS



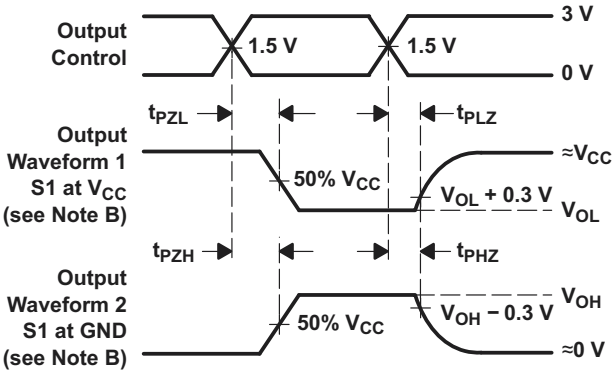
VOLTAGE WAVEFORMS
PULSE DURATION



VOLTAGE WAVEFORMS
SETUP AND HOLD TIMES



VOLTAGE WAVEFORMS
PROPAGATION DELAY TIMES
INVERTING AND NONINVERTING OUTPUTS



VOLTAGE WAVEFORMS
ENABLE AND DISABLE TIMES
LOW- AND HIGH-LEVEL ENABLING

NOTES: A. C_L includes probe and jig capacitance.
B. Waveform 1 is for an output with internal conditions such that the output is low except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high except when disabled by the output control.
C. All input pulses are supplied by generators having the following characteristics: PRR ≤ 1 MHz, Z_O = 50 Ω, t_r ≤ 3 ns, t_f ≤ 3 ns.
D. The outputs are measured one at a time with one input transition per measurement.
E. All parameters and waveforms are not applicable to all devices.

図 7-1. Load Circuit and Voltage Waveforms

8 Detailed Description

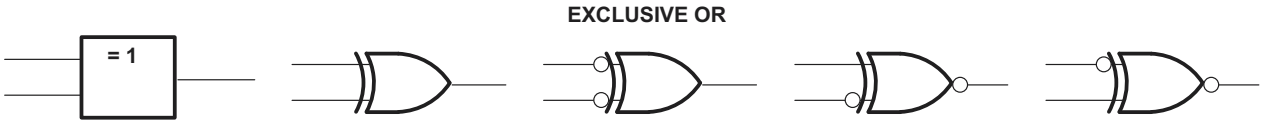
8.1 Overview

The SNx4AHCT86 devices are quadruple 2-input exclusive-OR gates. These devices perform the Boolean function $Y = A \times B$ or $Y = \overline{A}B + A\overline{B}$ in positive logic.

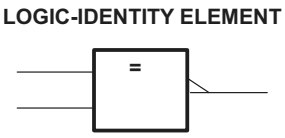
The inputs are TTL compatible allowing 3.3 V to 5 V translation.

8.2 Functional Block Diagram

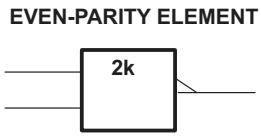
An exclusive-OR gate has many applications, some of which can be represented better by alternative logic symbols.



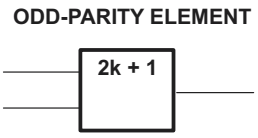
These are five equivalent exclusive-OR symbols valid for an SN74AHCT86 gate in positive logic; negation may be shown at any two ports.



The output is active (low) if all inputs stand at the same logic level (that is, A = B).



The output is active (low) if an even number of inputs (that is, 0 or 2) are active.



The output is active (high) if an odd number of inputs (that is, only 1 of the 2) are active.

図 8-1. Exclusive-OR Logic

8.3 Feature Description

- TTL inputs
  - Lowered switching threshold allows up translation 3.3 V to 5 V
- Slow edges reduce output ringing

8.4 Device Functional Modes

表 8-1. Function Table (Each Gate)

INPUTS		OUTPUT Y
A	B	
L	L	L
L	H	H
H	L	H
H	H	L

9 Application and Implementation

注

以下のアプリケーション情報は、TI の製品仕様に含まれるものではなく、TI ではその正確性または完全性を保証いたしません。個々の目的に対する製品の適合性については、お客様の責任で判断していただくことになります。お客様は自身の設計実装を検証しテストすることで、システムの機能を確認する必要があります。

9.1 Application Information

The SNx4AHCT86 is a low-drive CMOS device that can be used for a multitude of bus interface type applications where output ringing is a concern. The low drive and slow edge rates will minimize overshoot and undershoot on the outputs. The input switching levels have been lowered to accommodate TTL inputs of 0.8-V V_{IL} and 2-V V_{IH}. This feature makes the device ideal for translating up from 3.3 V to 5 V. 図 9-2 shows this type of translation.

9.2 Typical Application

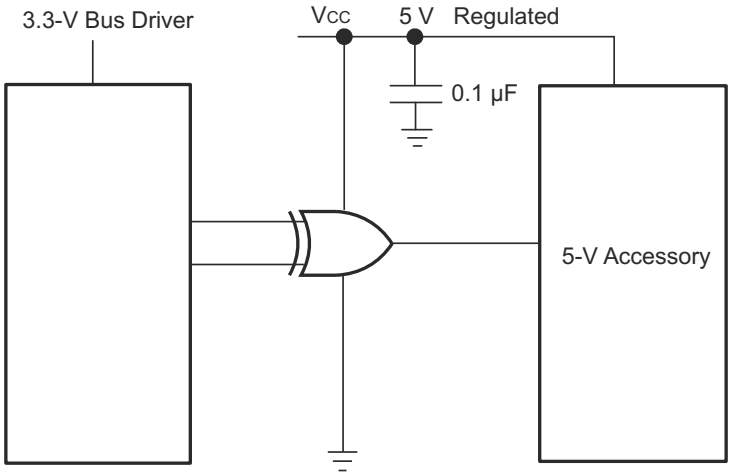


図 9-1. Typical Application Schematic

9.2.1 Design Requirements

This device uses CMOS technology and has balanced output drive. Care should be taken to avoid bus contention because it can drive currents that would exceed maximum limits. The high drive will also create fast edges into light loads; therefore, routing and load conditions should be considered to prevent ringing.

9.2.2 Detailed Design Procedure

1. Recommended input conditions:
   - Rise time and fall time specs: see (Δt/ΔV) in the *Recommended Operating Conditions* table.
   - Specified High and low levels: see (V_{IH} and V_{IL}) in the *Recommended Operating Conditions* table.
   - Inputs are overvoltage tolerant allowing them to go as high as 5.5 V at any valid V_{CC}
2. Recommend output conditions:
   - Load currents should not exceed 25 mA per output and 75 mA total for the part
   - Outputs should not be pulled above V_{CC}

9.2.3 Application Curves

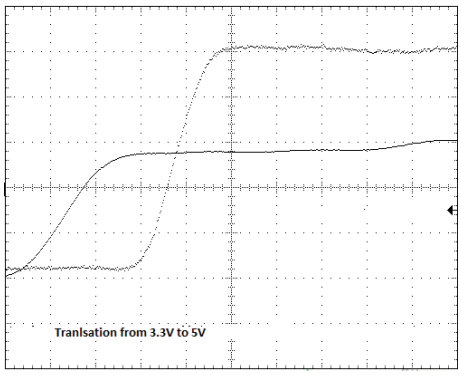


図 9-2. Up Translation

9.3 Power Supply Recommendations

The power supply can be any voltage between the MIN and MAX supply voltage rating located in the *Recommended Operating Conditions* table.

Each V_{CC} pin should have a good bypass capacitor to prevent power disturbance. For devices with a single supply, 0.1 µF is recommended. If there are multiple V_{CC} pins, 0.01 µF or 0.022 µF is recommended for each power pin. It is acceptable to parallel multiple bypass caps to reject different frequencies of noise. A 0.1 µF and 1 µF are commonly used in parallel. The bypass capacitor should be installed as close to the power pin as possible for best results.

9.4 Layout

9.4.1 Layout Guidelines

When using multiple bit logic devices inputs should not ever float.

In many cases, functions or parts of functions of digital logic devices are unused, for example, when only two inputs of a triple-input AND gate are used or only 3 of the 4 buffer gates are used. Such input pins should not be left unconnected because the undefined voltages at the outside connections result in undefined operational states. Specified in 図 9-3 are the rules that must be observed under all circumstances. All unused inputs of digital logic devices must be connected to a high or low bias to prevent them from floating. The logic level that should be applied to any particular unused input depends on the function of the device. Generally they will be tied to GND or V_{CC}; whichever makes more sense or is more convenient. It is generally acceptable to float outputs unless the part is a transceiver. If the transceiver has an output enable pin, it will disable the outputs section of the part when asserted. This will not disable the input section of the IOs so they cannot float when disabled.

9.4.2 Layout Example

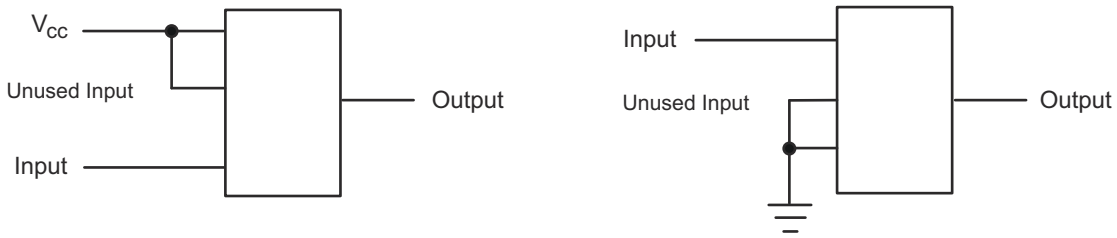


図 9-3. Layout Diagram

10 Device and Documentation Support

10.1 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、ti.com のデバイス製品フォルダを開いてください。「更新の通知を受け取る」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れます。変更の詳細については、修正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。

10.2 サポート・リソース

TI 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、設計で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、該当する貢献者により、現状のまま提供されるものです。これらは TI の仕様を構成するものではなく、必ずしも TI の見解を反映したものではありません。TI の使用条件を参照してください。

10.3 Trademarks

TI 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。

10.4 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。

10.5 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。

11 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 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
5962-9681701Q2A	ACTIVE	LCCC	FK	20	55	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	5962-9681701Q2A SNJ54AHCT 86FK	Samples
5962-9681701QCA	ACTIVE	CDIP	J	14	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	5962-9681701QC A SNJ54AHCT86J	Samples
SN74AHCT86BQAR	ACTIVE	WQFN	BQA	14	3000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 125	AHCT86	Samples
SN74AHCT86D	OBSOLETE	SOIC	D	14		TBD	Call TI	Call TI	-40 to 85	AHCT86	
SN74AHCT86DBR	ACTIVE	SSOP	DB	14	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 125	HB86	Samples
SN74AHCT86DGVR	ACTIVE	TVSOP	DGV	14	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 125	HB86	Samples
SN74AHCT86DR	ACTIVE	SOIC	D	14	2500	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 125	AHCT86	Samples
SN74AHCT86N	ACTIVE	PDIP	N	14	25	RoHS & Green	NIPDAU	N / A for Pkg Type	-40 to 125	SN74AHCT86N	Samples
SN74AHCT86NSR	ACTIVE	SO	NS	14	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 125	AHCT86	Samples
SN74AHCT86PW	OBSOLETE	TSSOP	PW	14		TBD	Call TI	Call TI	-40 to 125	HB86	
SN74AHCT86PWR	ACTIVE	TSSOP	PW	14	2000	RoHS & Green	NIPDAU | SN	Level-1-260C-UNLIM	-40 to 125	HB86	Samples
SN74AHCT86RGYR	ACTIVE	VQFN	RGY	14	3000	RoHS & Green	NIPDAU	Level-2-260C-1 YEAR	-40 to 125	HB86	Samples
SN74AHCT86RGYRG4	ACTIVE	VQFN	RGY	14	3000	RoHS & Green	NIPDAU	Level-2-260C-1 YEAR	-40 to 125	HB86	Samples
SNJ54AHCT86FK	ACTIVE	LCCC	FK	20	55	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	5962-9681701Q2A SNJ54AHCT 86FK	Samples
SNJ54AHCT86J	ACTIVE	CDIP	J	14	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	5962-9681701QC A SNJ54AHCT86J	Samples

(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.

OTHER QUALIFIED VERSIONS OF SN54AHCT86, SN74AHCT86 :

- Catalog : SN74AHCT86
- Military : SN54AHCT86

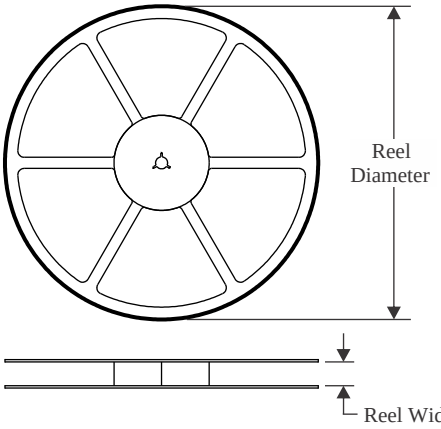
NOTE: Qualified Version Definitions:

- Catalog - TI's standard catalog product

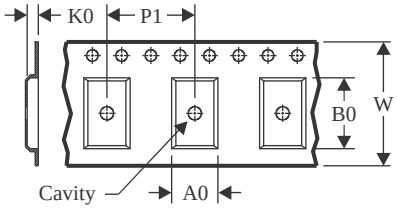
- Military - QML certified for Military and Defense Applications

TAPE AND REEL INFORMATION

REEL DIMENSIONS

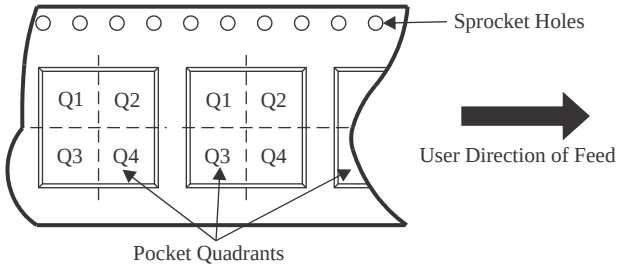


TAPE DIMENSIONS



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

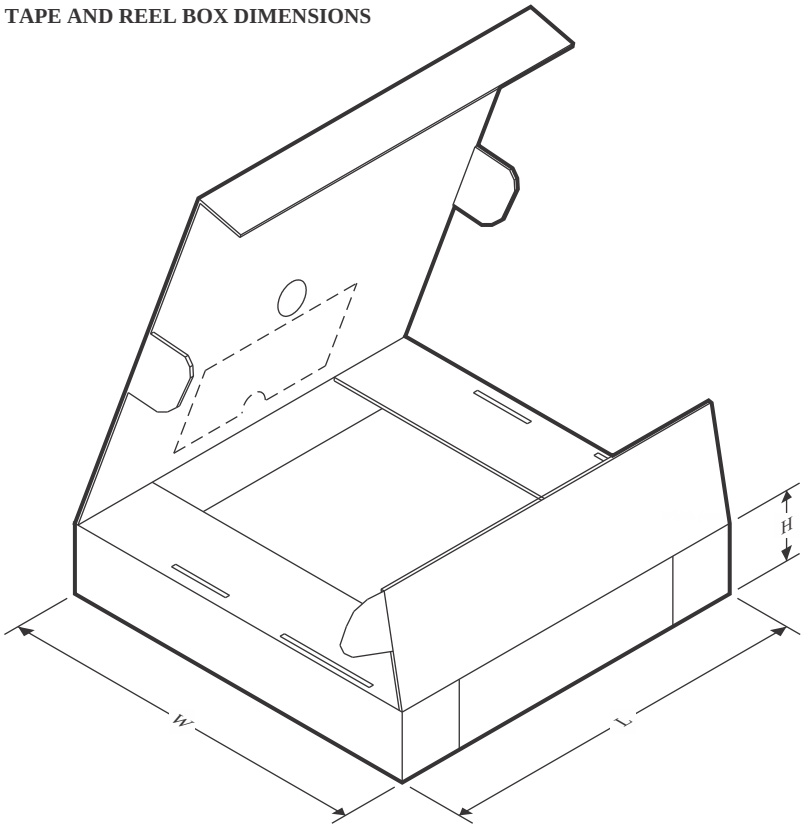
QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*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
SN74AHCT86BQAR	WQFN	BQA	14	3000	180.0	12.4	2.8	3.3	1.1	4.0	12.0	Q1
SN74AHCT86DBR	SSOP	DB	14	2000	330.0	16.4	8.35	6.6	2.4	12.0	16.0	Q1
SN74AHCT86DGVR	TVSOP	DGV	14	2000	330.0	12.4	6.8	4.0	1.6	8.0	12.0	Q1
SN74AHCT86DR	SOIC	D	14	2500	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1
SN74AHCT86DR	SOIC	D	14	2500	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1
SN74AHCT86NSR	SO	NS	14	2000	330.0	16.4	8.2	10.5	2.5	12.0	16.0	Q1
SN74AHCT86PWR	TSSOP	PW	14	2000	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1
SN74AHCT86PWR	TSSOP	PW	14	2000	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1
SN74AHCT86RGYR	VQFN	RGY	14	3000	330.0	12.4	3.75	3.75	1.15	8.0	12.0	Q1

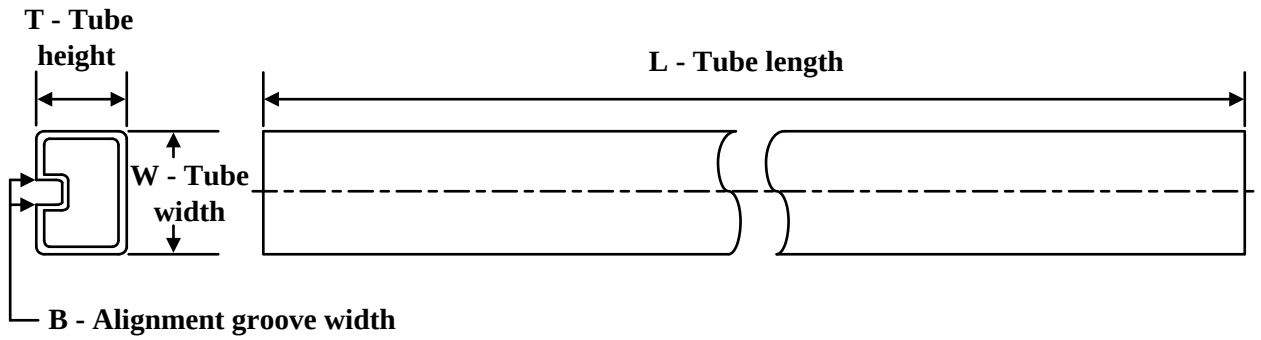
TAPE AND REEL BOX DIMENSIONS



*All dimensions are nominal

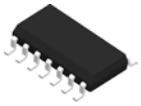
Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74AHCT86BQAR	WQFN	BQA	14	3000	210.0	185.0	35.0
SN74AHCT86DBR	SSOP	DB	14	2000	356.0	356.0	35.0
SN74AHCT86DGVR	TVSOP	DGV	14	2000	356.0	356.0	35.0
SN74AHCT86DR	SOIC	D	14	2500	353.0	353.0	32.0
SN74AHCT86DR	SOIC	D	14	2500	356.0	356.0	35.0
SN74AHCT86NSR	SO	NS	14	2000	356.0	356.0	35.0
SN74AHCT86PWR	TSSOP	PW	14	2000	356.0	356.0	35.0
SN74AHCT86PWR	TSSOP	PW	14	2000	353.0	353.0	32.0
SN74AHCT86RGYR	VQFN	RGY	14	3000	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)
5962-9681701Q2A	FK	LCCC	20	55	506.98	12.06	2030	NA
SN74AHCT86N	N	PDIP	14	25	506	13.97	11230	4.32
SN74AHCT86N	N	PDIP	14	25	506	13.97	11230	4.32
SNJ54AHCT86FK	FK	LCCC	20	55	506.98	12.06	2030	NA

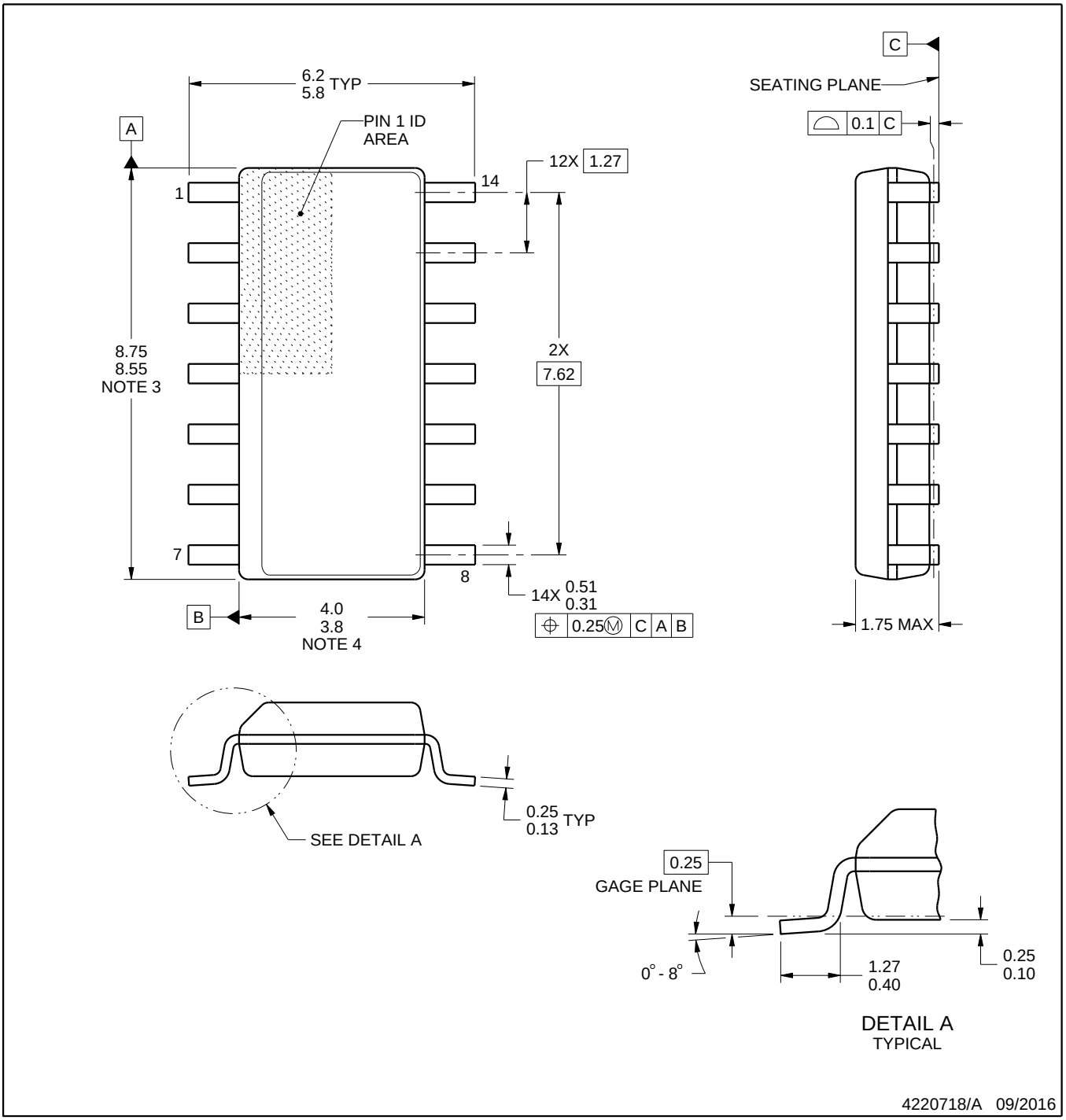


PACKAGE OUTLINE

D0014A

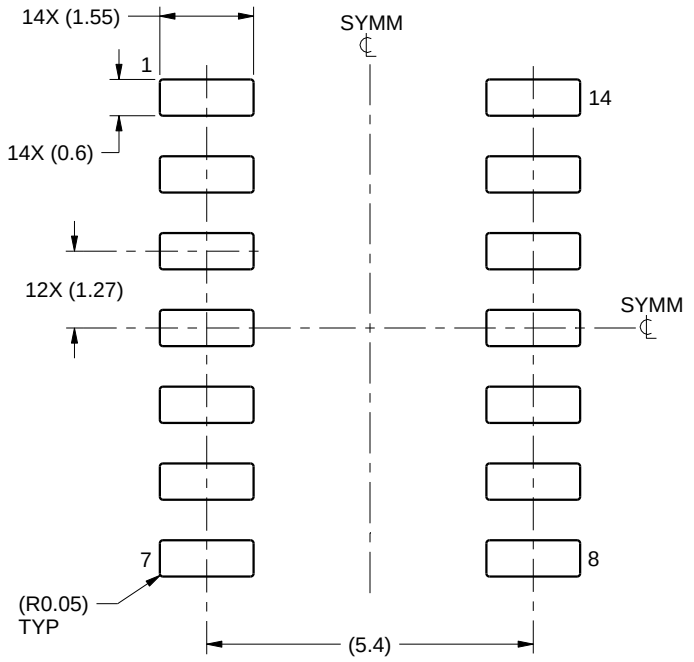
SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT

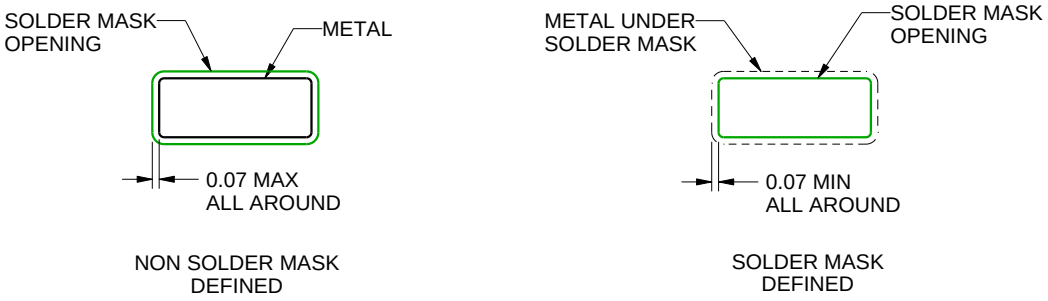


NOTES:

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.



LAND PATTERN EXAMPLE
SCALE:8X



SOLDER MASK DETAILS

4220718/A 09/2016

NOTES: (continued)

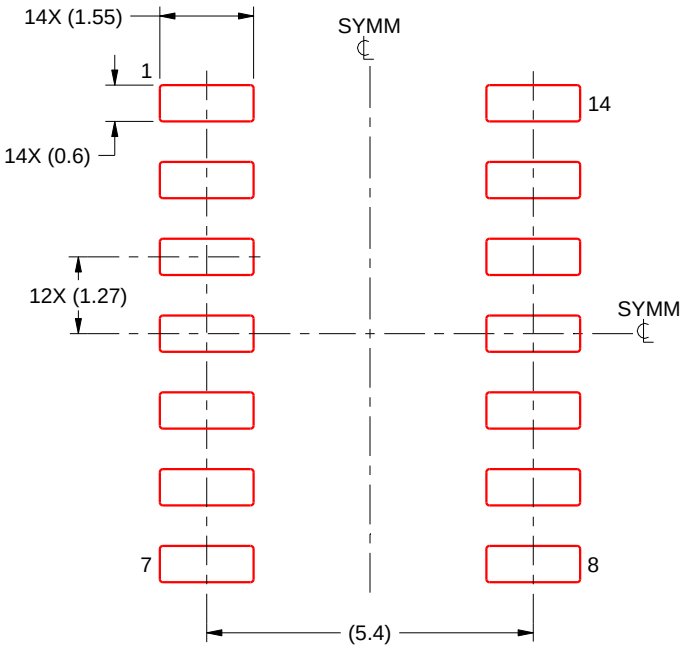
6. Publication IPC-7351 may have alternate designs.
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

EXAMPLE STENCIL DESIGN

D0014A

SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT



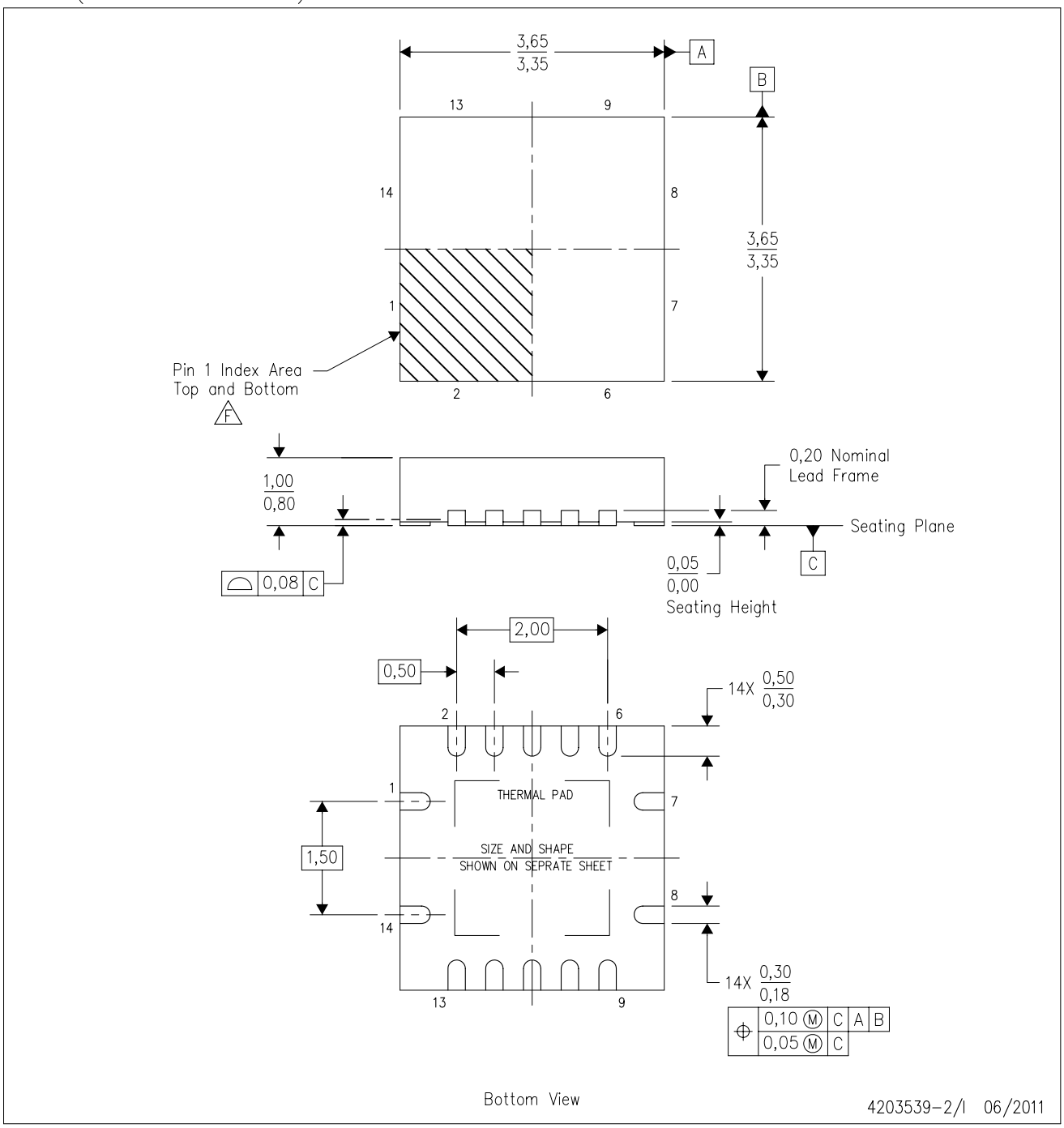
SOLDER PASTE EXAMPLE
BASED ON 0.125 mm THICK STENCIL
SCALE:8X

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.

RGY (S–PVQFN–N14) PLASTIC QUAD FLATPACK NO–LEAD



NOTES:
A. All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5M–1994.
B. This drawing is subject to change without notice.
C. QFN (Quad Flatpack No–Lead) package configuration.
D. The package thermal pad must be soldered to the board for thermal and mechanical performance.
E. See the additional figure in the Product Data Sheet for details regarding the exposed thermal pad features and dimensions.
F. Pin 1 identifiers are located on both top and bottom of the package and within the zone indicated. The Pin 1 identifiers are either a molded, marked, or metal feature.
G. Package complies to JEDEC MO–241 variation BA.

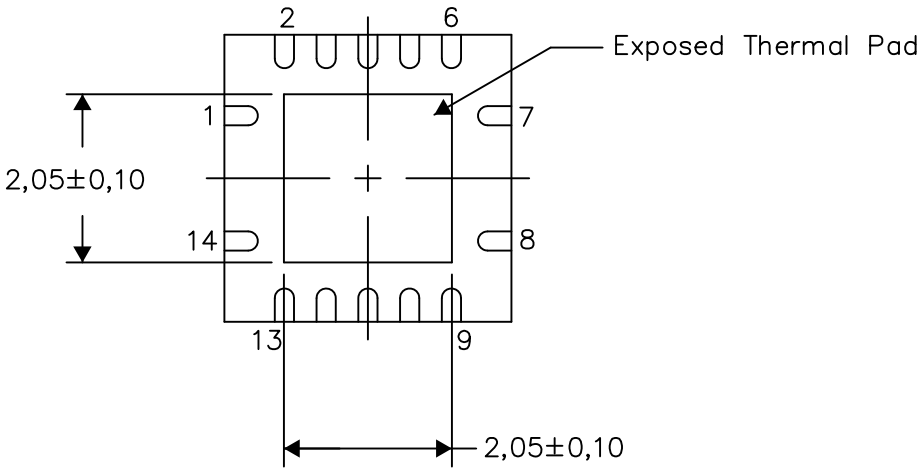
RGY (S–PVQFN–N14) PLASTIC QUAD FLATPACK NO–LEAD

THERMAL INFORMATION

This package incorporates an exposed thermal pad that is designed to be attached directly to an external heatsink. The thermal pad must be soldered directly to the printed circuit board (PCB). After soldering, the PCB can be used as a heatsink. In addition, through the use of thermal vias, the thermal pad can be attached directly to the appropriate copper plane shown in the electrical schematic for the device, or alternatively, can be attached to a special heatsink structure designed into the PCB. This design optimizes the heat transfer from the integrated circuit (IC).

For information on the Quad Flatpack No–Lead (QFN) package and its advantages, refer to Application Report, QFN/SON PCB Attachment, Texas Instruments Literature No. SLUA271. This document is available at www.ti.com.

The exposed thermal pad dimensions for this package are shown in the following illustration.



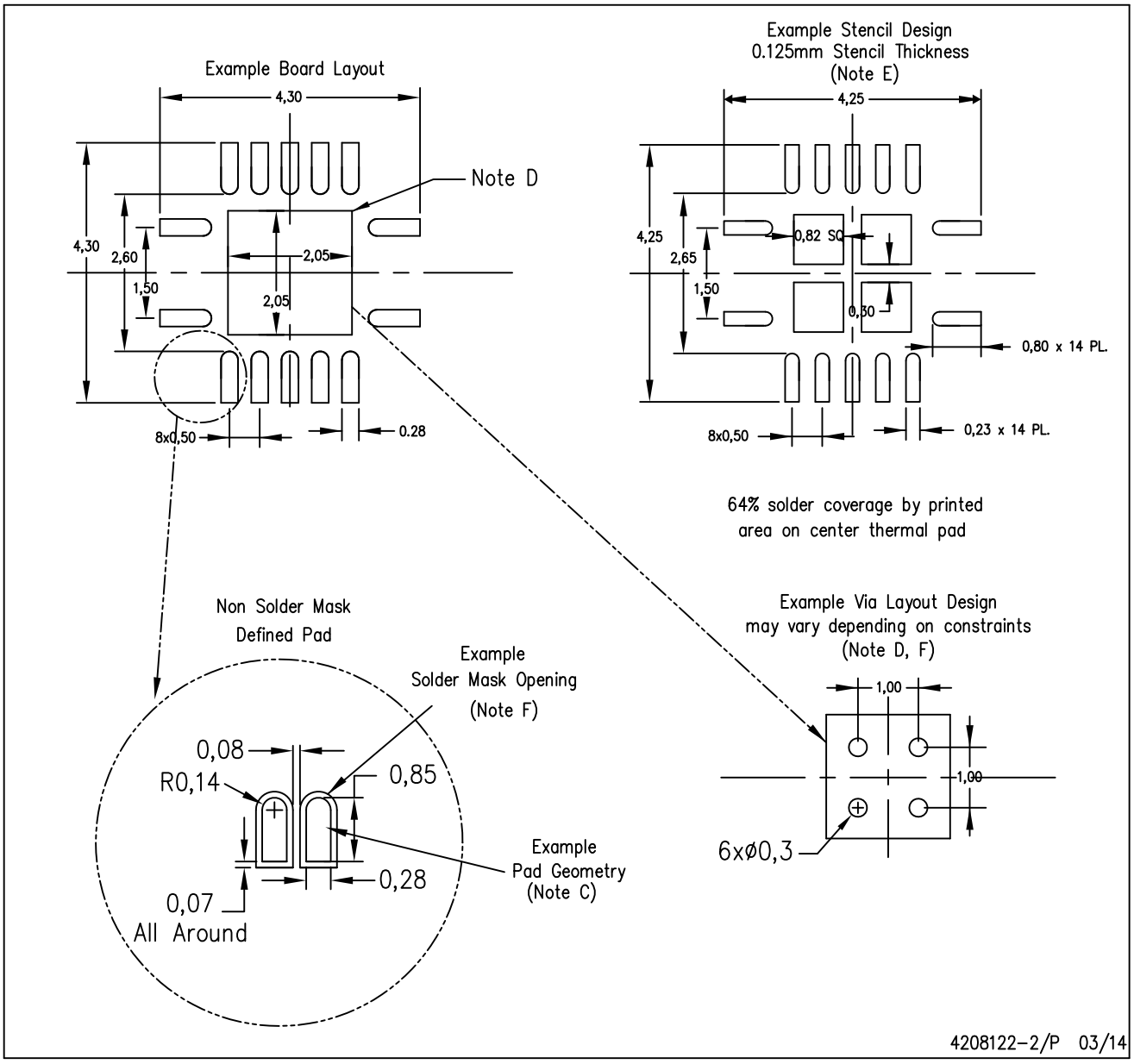
Bottom View

Exposed Thermal Pad Dimensions

4206353–2/P 03/14

NOTE: All linear dimensions are in millimeters

RGY (S–PVQFN–N14) PLASTIC QUAD FLATPACK NO–LEAD



NOTES:
A. All linear dimensions are in millimeters.
B. This drawing is subject to change without notice.
C. Publication IPC–7351 is recommended for alternate designs.
D. This package is designed to be soldered to a thermal pad on the board. Refer to Application Note, Quad Flat–Pack QFN/SON PCB Attachment, Texas Instruments Literature No. SLUA271, and also the Product Data Sheets for specific thermal information, via requirements, and recommended board layout. These documents are available at www.ti.com <http: //www.ti.com>.
E. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Refer to IPC 7525 for stencil design considerations.
F. Customers should contact their board fabrication site for minimum solder mask web tolerances between signal pads.

GENERIC PACKAGE VIEW

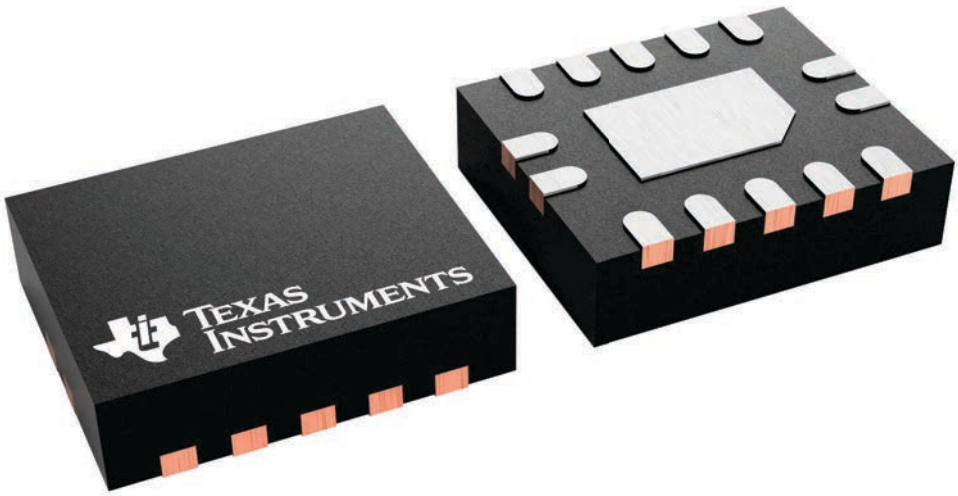
BQA 14

WQFN - 0.8 mm max height

2.5 x 3, 0.5 mm pitch

PLASTIC QUAD FLATPACK - NO LEAD

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

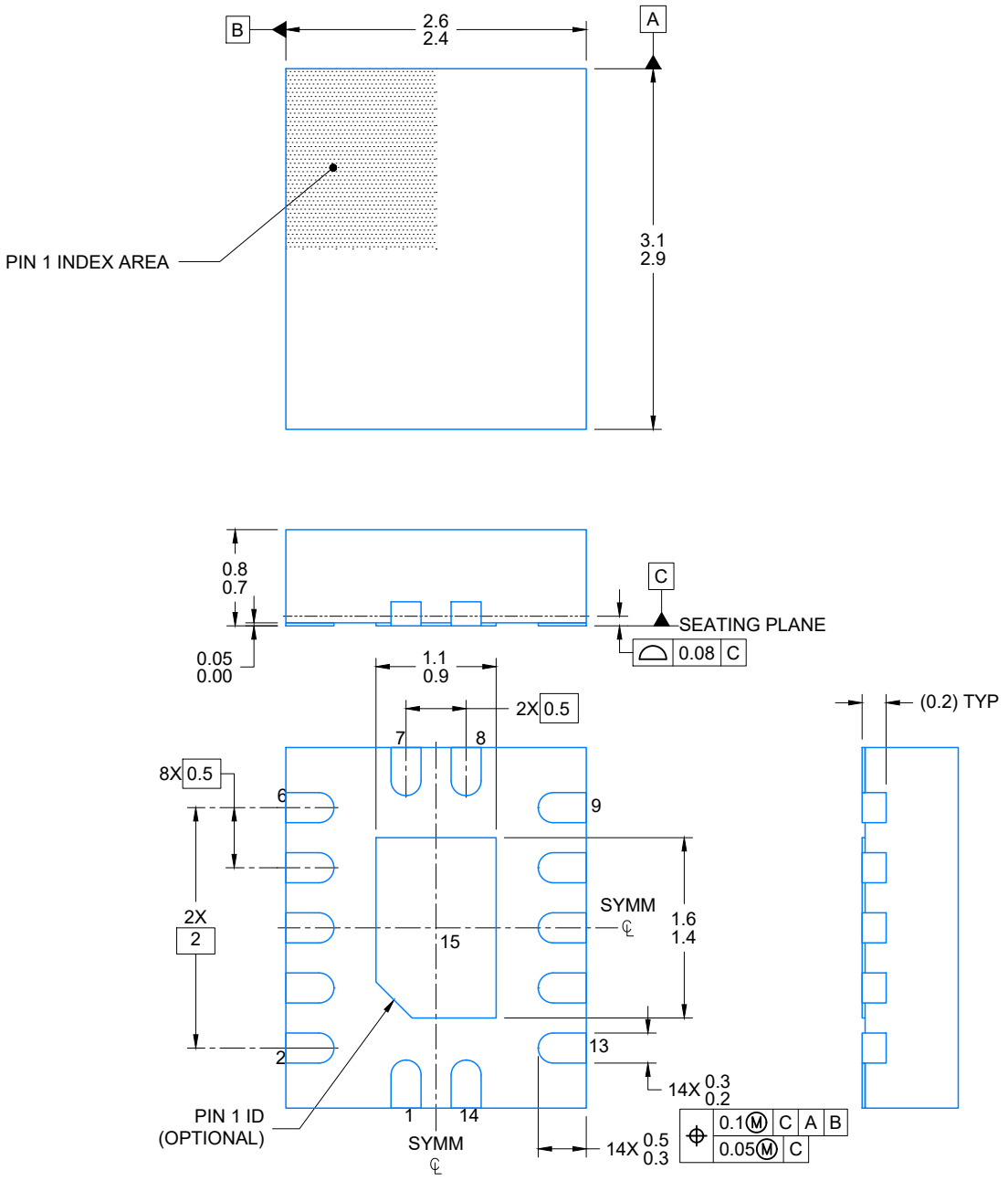


PACKAGE OUTLINE

BQA0014A

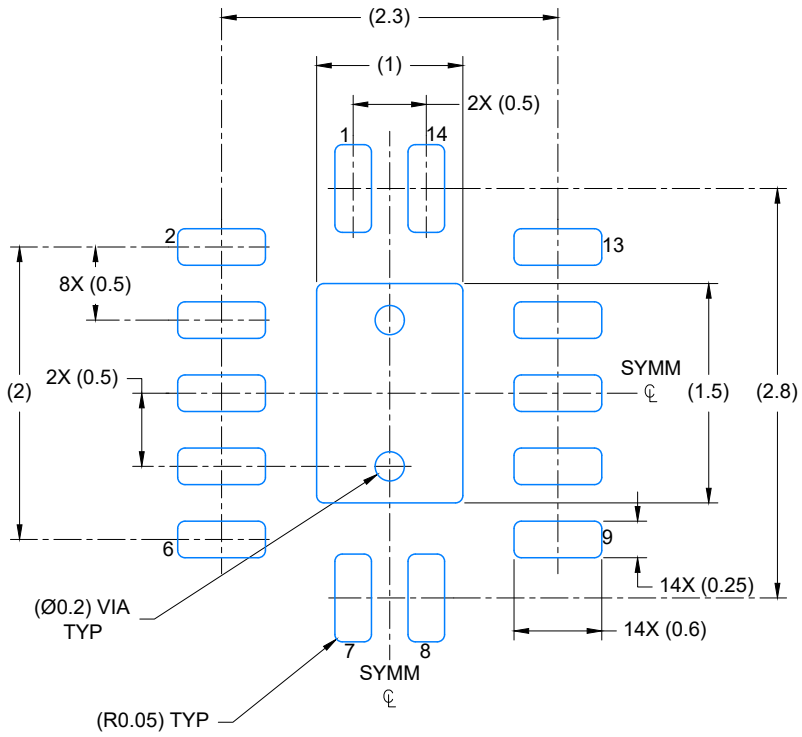
WQFN - 0.8 mm max height

PLASTIC QUAD FLAT PACK-NO LEAD

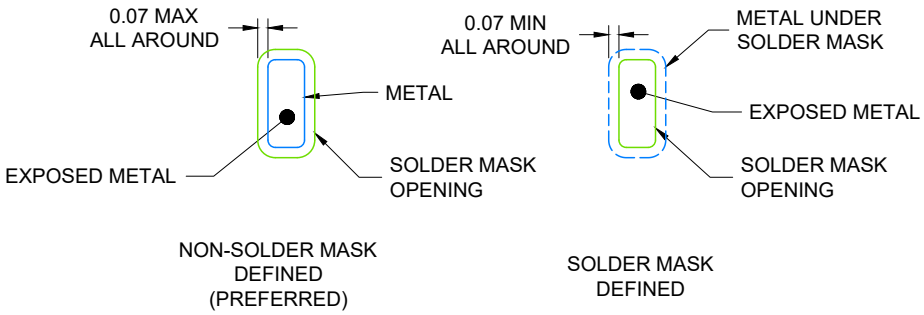


NOTES:

1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. The package thermal pad must be soldered to the printed circuit board for optimal thermal and mechanical performance.



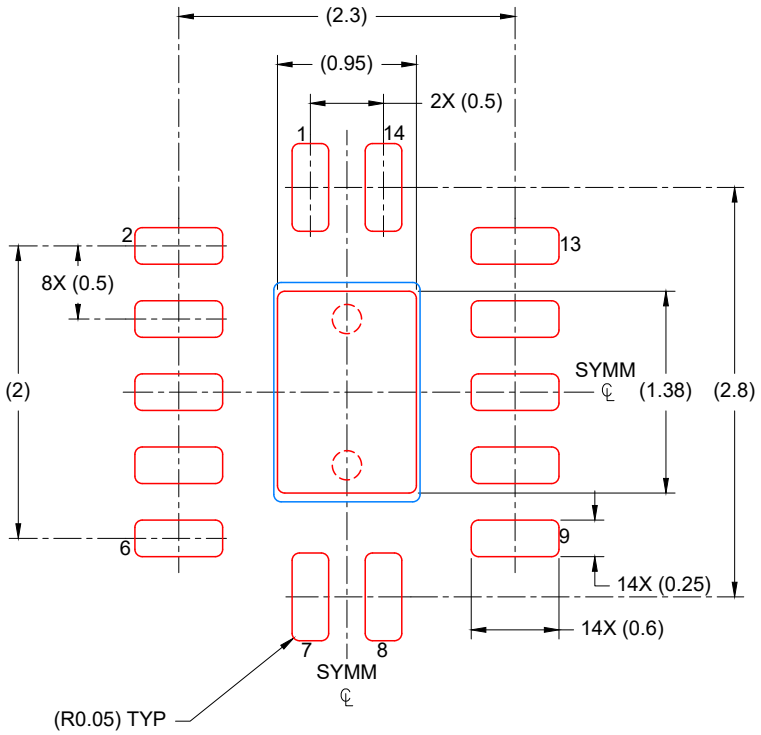
LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE: 20X



4224636/A 11/2018

NOTES: (continued)

4. This package is designed to be soldered to a thermal pad on the board. For more information, see Texas Instruments literature number SLUA271 (www.ti.com/lit/slua271).
5. Vias are optional depending on application, refer to device data sheet. If any vias are implemented, refer to their locations shown on this view. It is recommended that vias under paste be filled, plugged or tented.



SOLDER PASTE EXAMPLE
BASED ON 0.125 mm THICK STENCIL

EXPOSED PAD
88% PRINTED COVERAGE BY AREA
SCALE: 20X

4224636/A 11/2018

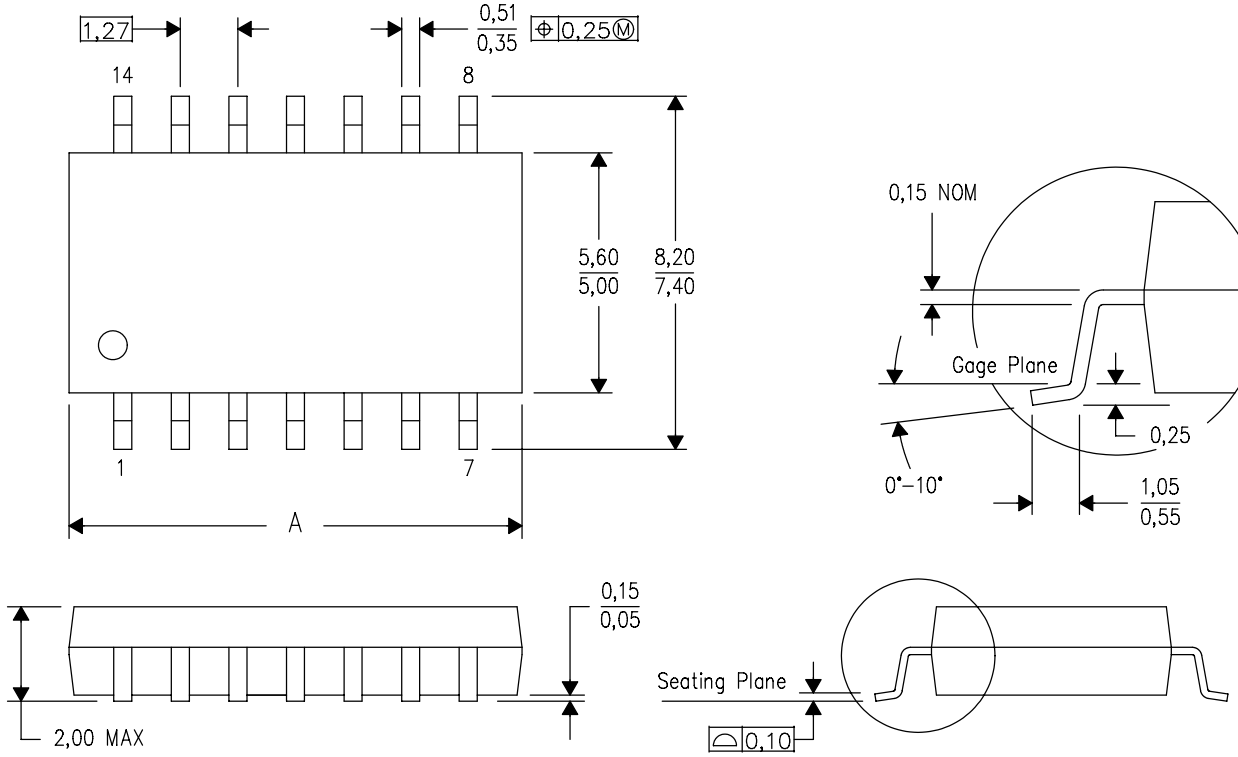
NOTES: (continued)

6. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.

MECHANICAL DATA

NS (R-PDSO-G)** **PLASTIC SMALL-OUTLINE PACKAGE**

14-PINS SHOWN



DIM \ PINS **	14	16	20	24
A MAX	10,50	10,50	12,90	15,30
A MIN	9,90	9,90	12,30	14,70

4040062/C 03/03

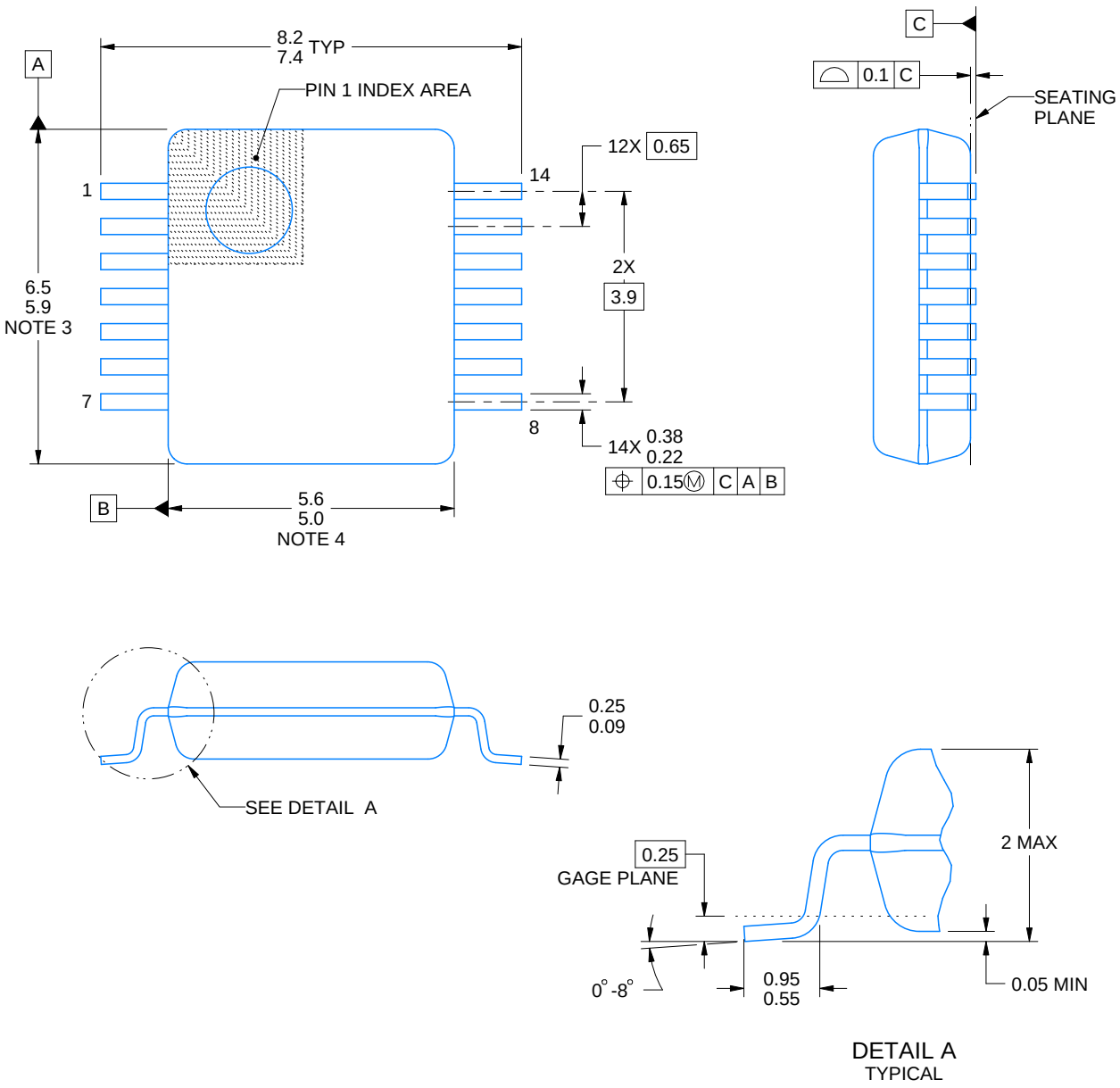
NOTES:
A. All linear dimensions are in millimeters.
B. This drawing is subject to change without notice.
C. Body dimensions do not include mold flash or protrusion, not to exceed 0,15.

PACKAGE OUTLINE

DB0014A

SSOP - 2 mm max height

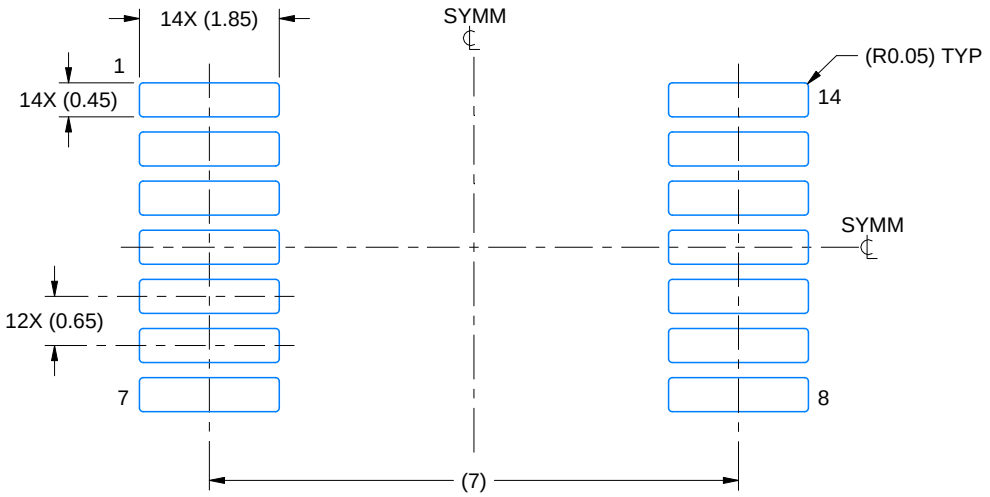
SMALL OUTLINE PACKAGE



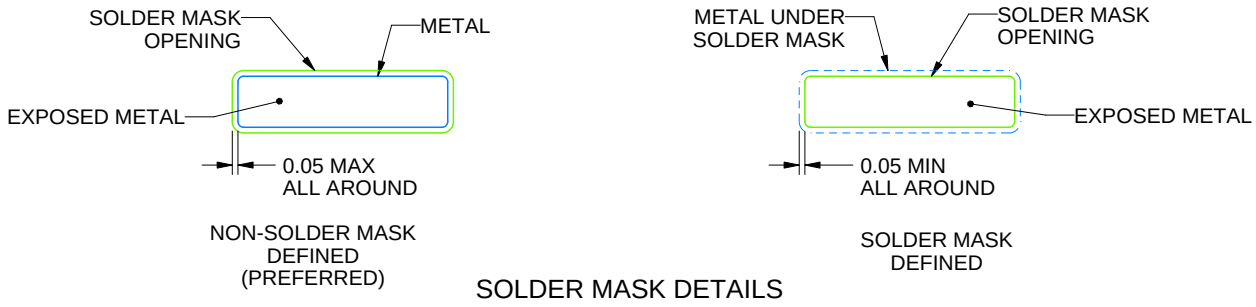
4220762/A 05/2024

NOTES:

1. All linear dimensions are in millimeters. Any 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. Reference JEDEC registration MO-150.



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE: 10X

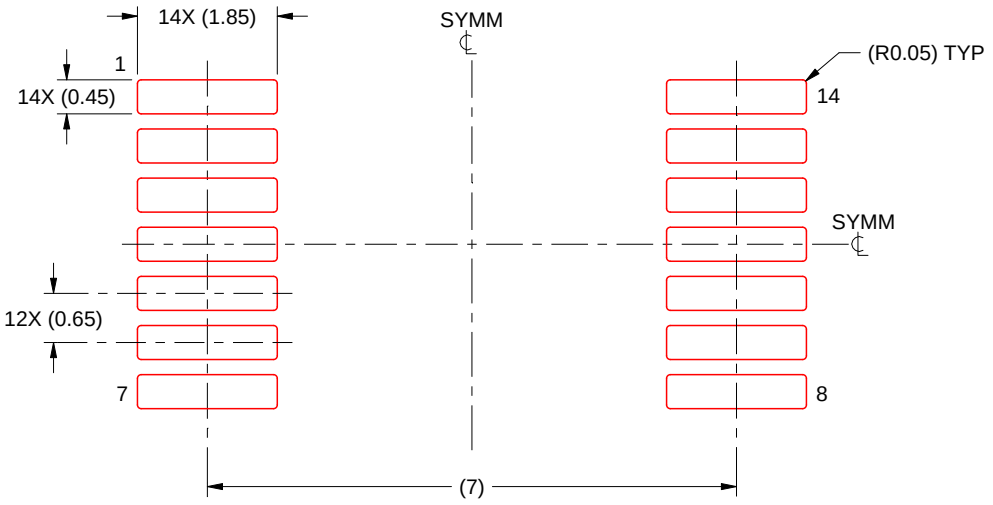


SOLDER MASK DETAILS

4220762/A 05/2024

NOTES: (continued)

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



SOLDER PASTE EXAMPLE
BASED ON 0.125 mm THICK STENCIL
SCALE: 10X

4220762/A 05/2024

NOTES: (continued)

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

GENERIC PACKAGE VIEW

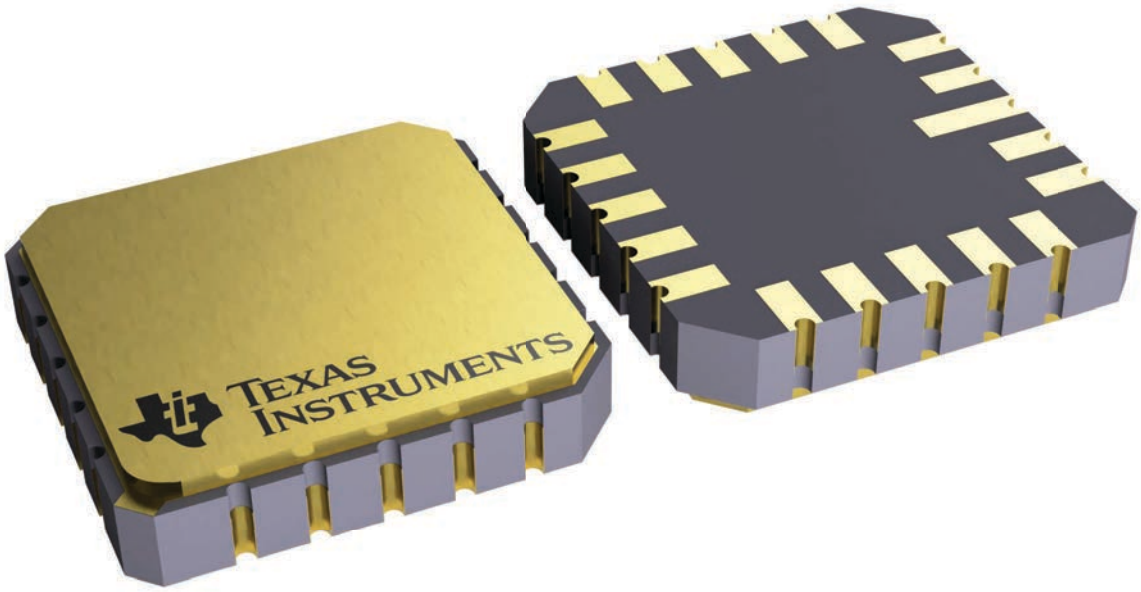
FK 20

LCCC - 2.03 mm max height

8.89 x 8.89, 1.27 mm pitch

LEADLESS CERAMIC CHIP CARRIER

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

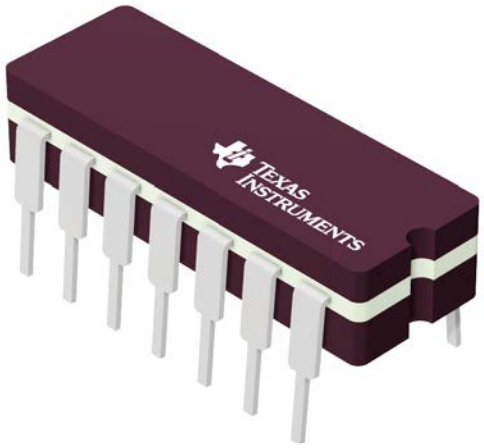


4229370VA\

GENERIC PACKAGE VIEW

J 14 CDIP - 5.08 mm max height

CERAMIC DUAL IN LINE PACKAGE



Images above are just a representation of the package family, actual package may vary.
Refer to the product data sheet for package details.

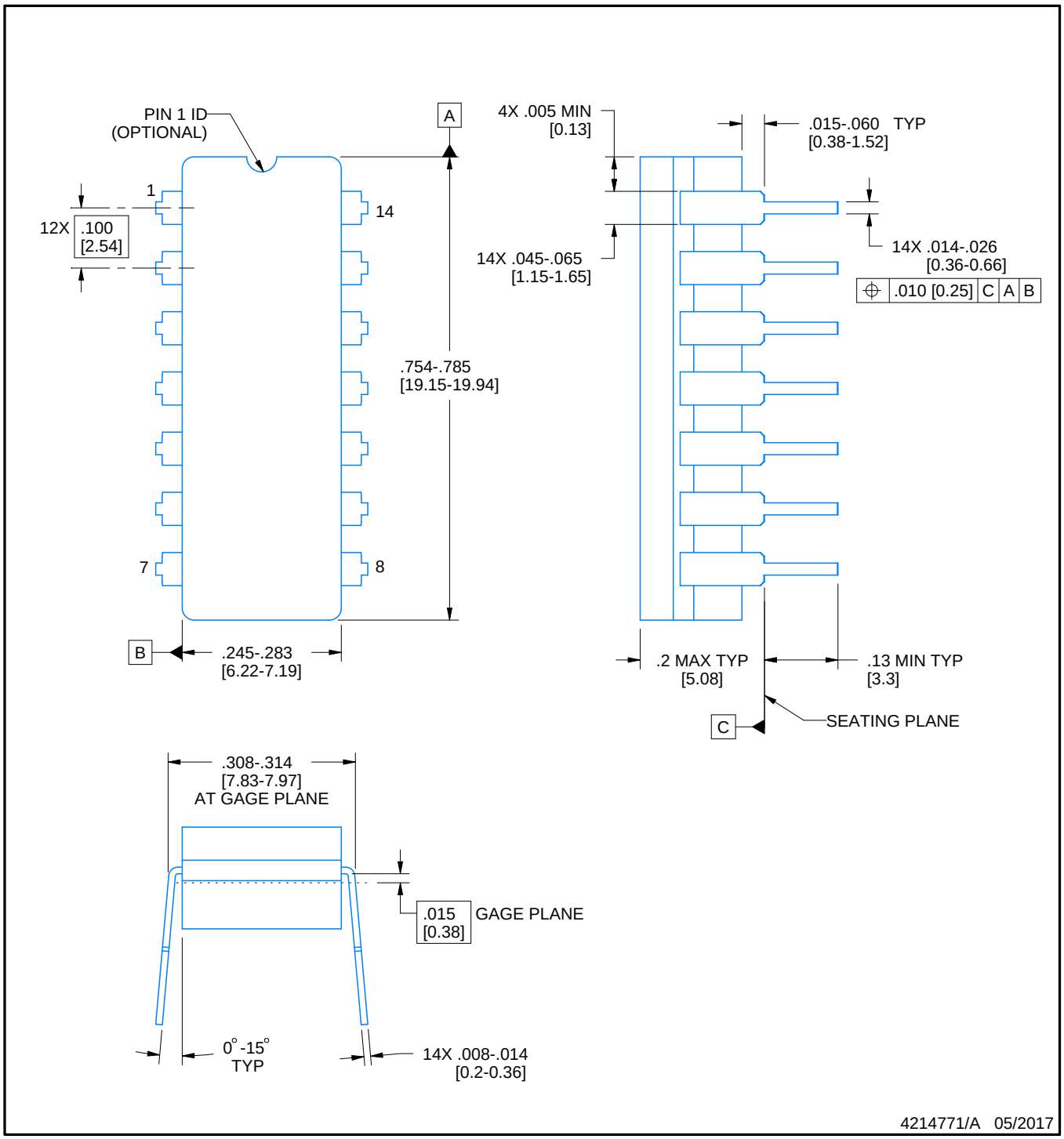
4040083-5/G

PACKAGE OUTLINE

J0014A

CDIP - 5.08 mm max height

CERAMIC DUAL IN LINE PACKAGE



NOTES:

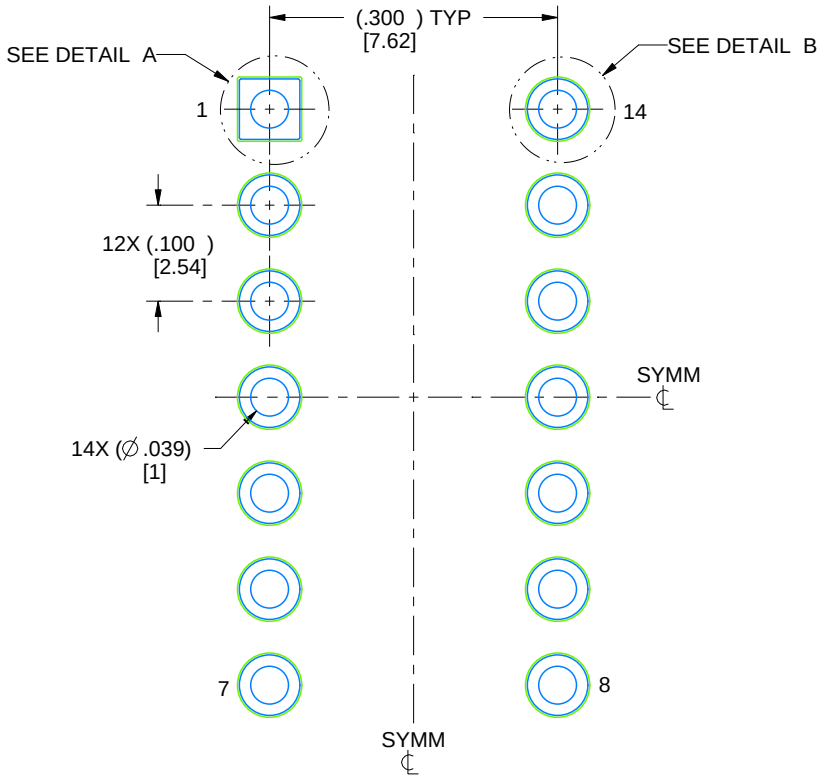
1. All controlling linear dimensions are in inches. Dimensions in brackets are in millimeters. Any dimension in brackets or parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This package is hermitically sealed with a ceramic lid using glass frit.
4. Index point is provided on cap for terminal identification only and on press ceramic glass frit seal only.
5. Falls within MIL-STD-1835 and GDIP1-T14.

EXAMPLE BOARD LAYOUT

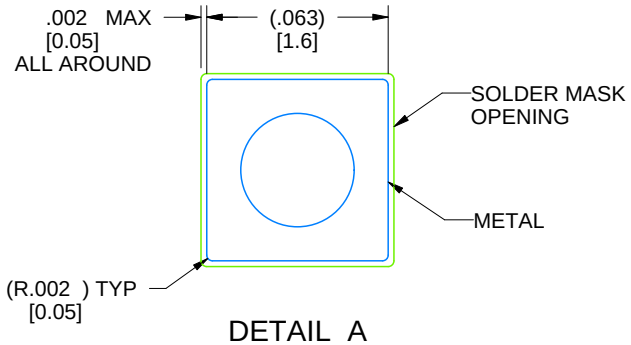
J0014A

CDIP - 5.08 mm max height

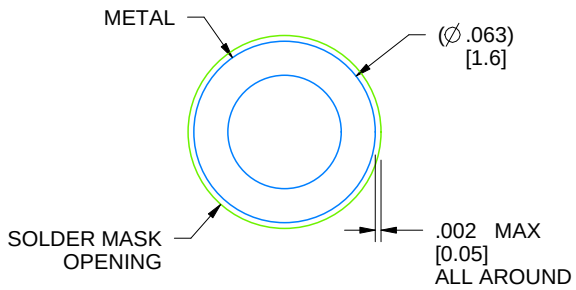
CERAMIC DUAL IN LINE PACKAGE



LAND PATTERN EXAMPLE
NON-SOLDER MASK DEFINED
SCALE: 5X



DETAIL A
SCALE: 15X



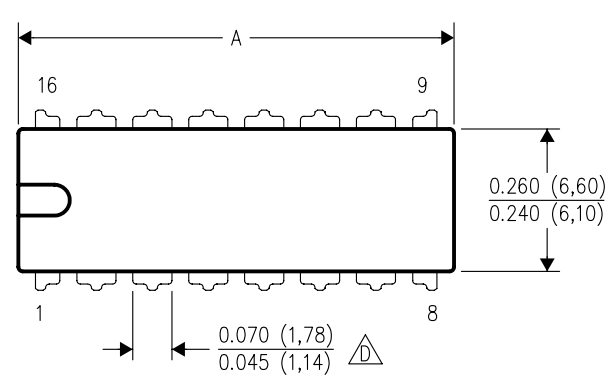
DETAIL B
13X, SCALE: 15X

4214771/A 05/2017

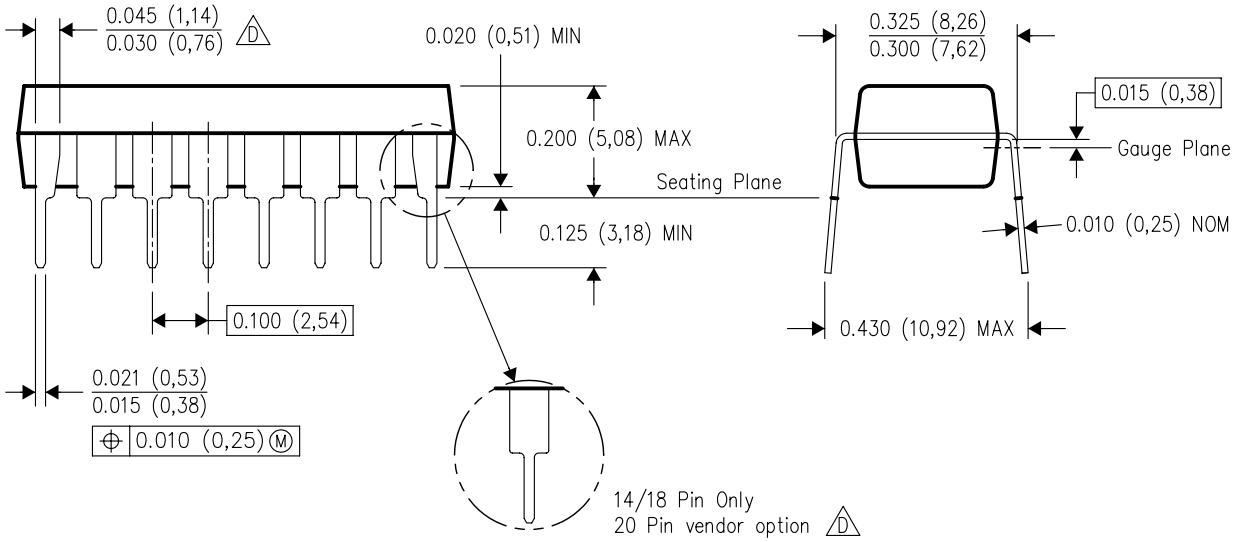
N (R–PDIP–T**)

PLASTIC DUAL–IN–LINE PACKAGE

16 PINS SHOWN



DIM \ PINS **	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 (C)	AA	BB	AC	AD



4040049/E 12/2002

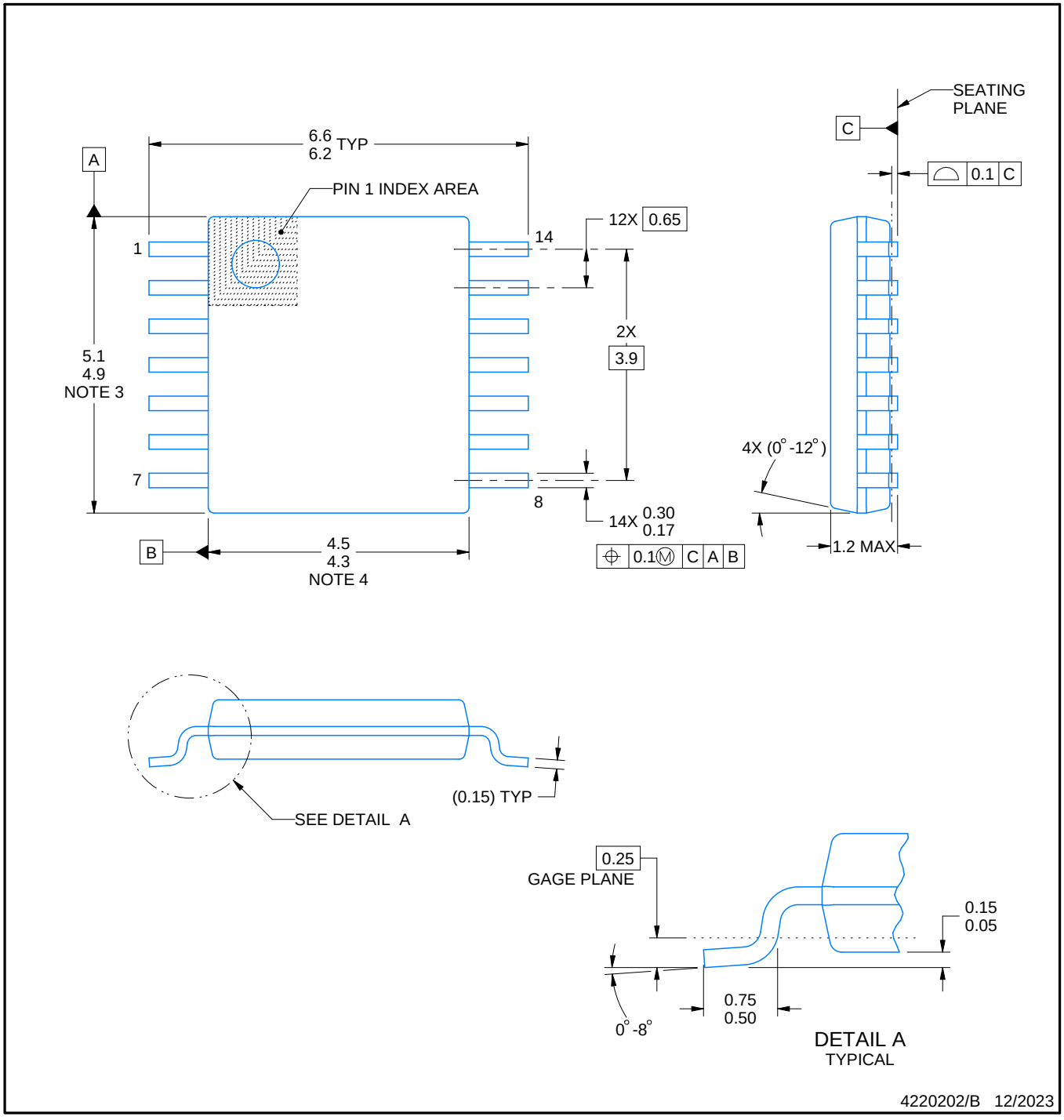
NOTES:
A. All linear dimensions are in inches (millimeters).
B. This drawing is subject to change without notice.
C. Falls within JEDEC MS–001, except 18 and 20 pin minimum body length (Dim A).
D. The 20 pin end lead shoulder width is a vendor option, either half or full width.

PACKAGE OUTLINE

PW0014A

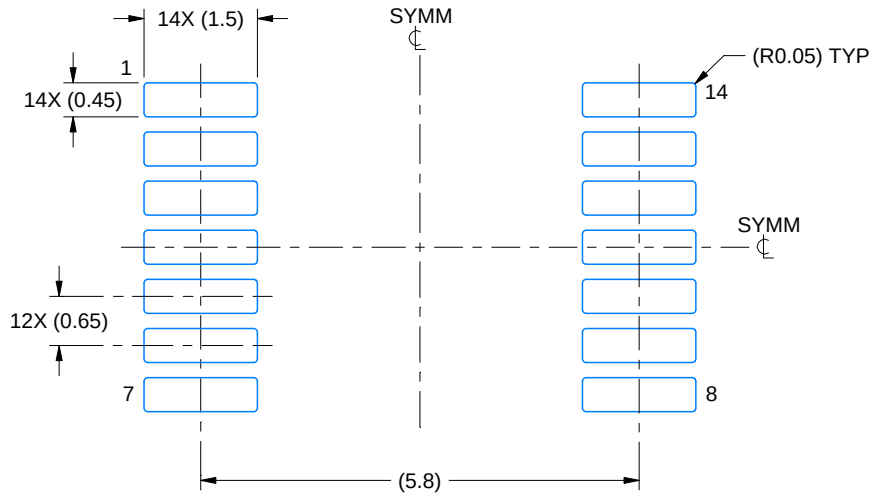
TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE

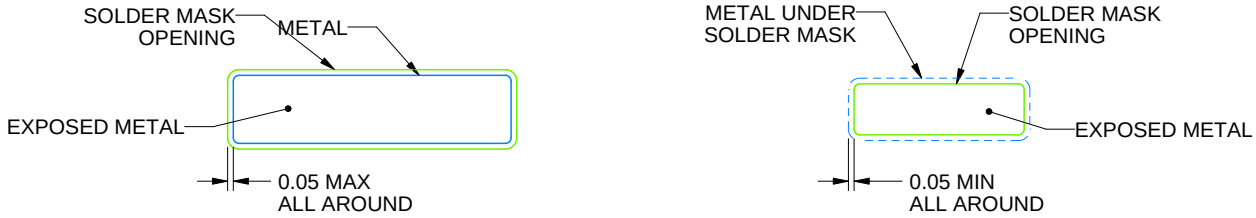


NOTES:

1. All linear dimensions are in millimeters. Any 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 MO-153.



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE: 10X

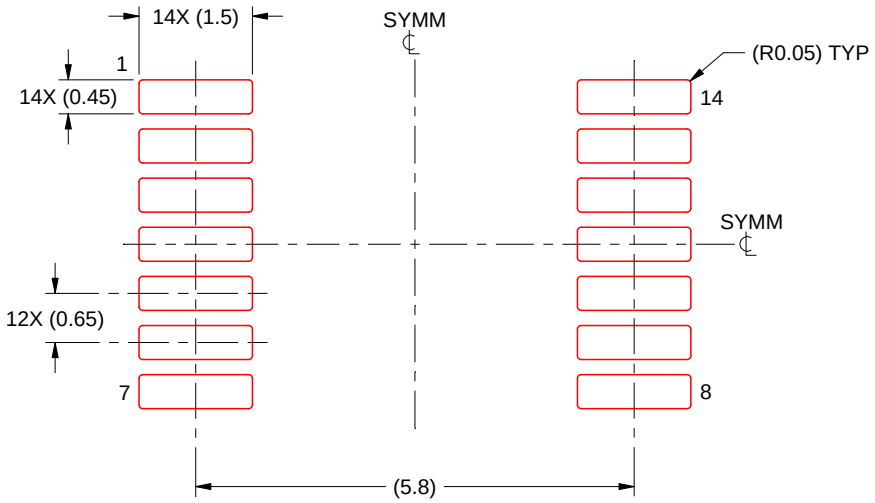


SOLDER MASK DETAILS

4220202/B 12/2023

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.



SOLDER PASTE EXAMPLE
BASED ON 0.125 mm THICK STENCIL
SCALE: 10X

4220202/B 12/2023

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.

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