SNx4HC393 Dual 4-Bit Binary Counters

1 Features

- Wide operating voltage range of 2V to 6V
- Outputs can drive up to 10 LSTTL loads
- Low power consumption: 80µA max I_{CC}
- Typical t_{pd} = 13ns
- ±4mA output drive at 5V
- Low input current of 1µA max
- Dual 4-bit binary counters with individual clocks
- Direct clear for each 4-bit counter
- Can significantly improve system densities by reducing counter package count by 50%

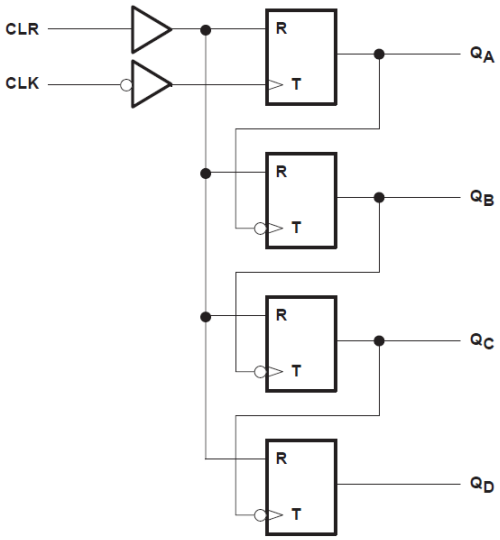
2 Description

The ’HC393 devices contain eight flip-flops and additional gating to implement two individual 4-bit counters in a single package.

Device Information

PART NUMBER	PACKAGE(1)	PACKAGE SIZE(2)	BODY SIZE(3)
SNx4HC393	D (SOIC, 14)	8.65 mm x 6mm	8.65 mm x 3.9 mm
	N (PDIP, 14))	19.3mm x 9.4mm	19.3mm x 6.35mm
	NS (SOP, 14)	10.3 mm x 7.8mm	10.3 mm x 5.3 mm
	DB (SSOP, 14)	6.2 mm x 7.8mm	6.2 mm x 5.3 mm
	PW (TSSOP, 14)	5 mm x 6.4mm	5 mm x 4.4 mm
	DYY (SOT-23, 14)	4.2mm x 3.26mm	4.2mm x 2mm
	J (CDIP, 14)	19.55mm x 7.9mm	19.55 mm x 6.7mm
	W (CFP, 14)	9.21mm x 9 mm	9.21mm x 6.28mm
	FK (LCCC, 14)	8.9mm x 8.9mm	8.9mm x 8.9mm

(1) For more information, see Mechanical, Packaging, and Orderable Information.
(2) The package size (length × width) is a nominal value and includes pins, where applicable.
(3) The body size (length × width) is a nominal value and does not include pins.



Logic Diagram, Each Counter (Positive Logic)

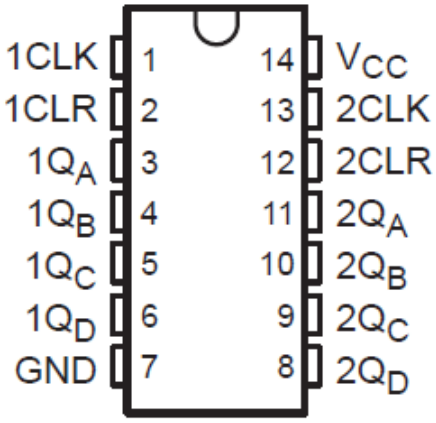
An IMPORTANT NOTICE at the end of this data sheet addresses availability, warranty, changes, use in safety-critical applications, intellectual property matters and other important disclaimers. PRODUCTION DATA.

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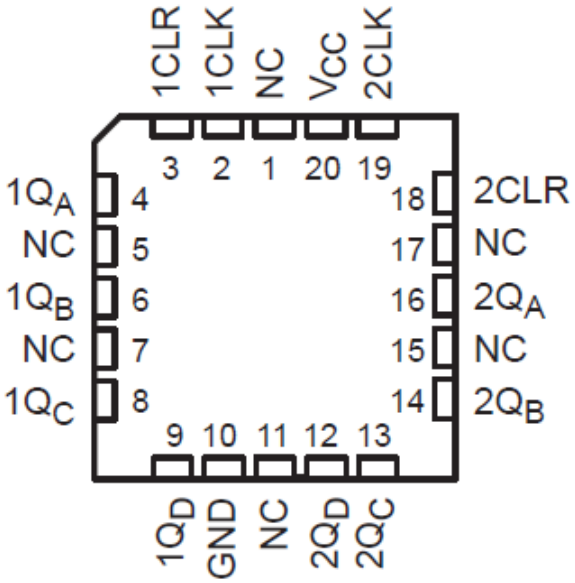
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3 Pin Configuration and Functions



SN54HC393 J or W Package, 14-Pin CDIP or CFP; SN74HC393 D, DB, DYY, N, NS, or PW Package; 14-Pin SOIC, SSOP, SOT-23, TVSOP, SOP, or TSSOP (Top View)



A. NC - No internal connection

SN54HC393 FK Package, 20-Pin LCCC (Top View)

Table 3-1. Pin Functions

PIN		TYPE[1]	DESCRIPTION
NAME	NO.		
1CLK	1	I	Counter 1 Clock Input
1CLR	2	I	Counter 1 Clear Input
$1Q_A$	3	O	Counter 1 A Output
$1Q_B$	4	O	Counter 1 B Output
$1Q_C$	5	O	Counter 1 B Output
$1Q_D$	6	O	Counter 1 B Output
GND	7	G	Ground
$2Q_D$	8	O	Counter 2 D Output
$2Q_C$	9	O	Counter 2 C Output
$2Q_B$	10	O	Counter 2 B Output
$2Q_A$	11	O	Counter 2 A Output
2CLR	12	I	Counter 2 Clear Input
2CLK	13	I	Counter 2 Clock Input
V_{CC}	14	P	V_{CC}

1. I = Input, O = Output, I/O = Input or Output, G = Ground, P = Power.

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4 Specifications

4.1 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
I_{IK}	Input clamp current(2)	For $V_I < 0$ V or $V_I > V_{CC}$		±20	mA
I_{OK}	Output clamp current(2)	For $V_O < 0$ V 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
T_{stg}	Storage temperature range		-65	150	℃

(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.

4.2 Recommended Operating Conditions

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

			SN54HC393			SN74HC393			UNIT
			MIN	NOM	MAX	MIN	NOM	MAX	
V_{CC}	Supply voltage		2	5	6	2	5	6	V
V_{IH}	High-level input voltage	V_{CC} = 2 V	1.5			1.5			V
		V_{CC} = 4.5 V	3.15			3.15			
		V_{CC} = 6 V	4.2			4.2			
V_{IL}	Low-level input voltage	V_{CC} = 2 V			0.5			0.5	V
		V_{CC} = 4.5 V			1.35			1.35	
		V_{CC} = 6 V			1.8			1.8	
V_I	Input voltage		0		V_{CC}	0		V_{CC}	V
V_O	Output voltage		0		V_{CC}	0		V_{CC}	V
$\Delta t/\Delta v$(2)	Input transition rise/fall time	V_{CC} = 2 V			1000			1000	ns
		V_{CC} = 4.5 V			500			500	
		V_{CC} = 6 V			400			400	
T_A	Operating free-air temperature		-55		125	-40		85	℃

(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*, literature number SCBA004.
(2) If this device is used in the threshold region (from V_{ILmax} = 0.5 V to V_{IHmin} = 1.5 V), there is a potential to go into the wrong state from induced grounding, causing double clocking. Operating with the inputs at t_t = 1000 ns and V_{CC} = 2 V does not damage the device; however, functionally, the CLK inputs are not ensured while in the shift, count, or toggle operating modes.

4.3 Thermal Information

THERMAL METRIC(1)		SN74HC393						UNIT
		D (SOIC)	DB (SSOP)	DYY (SOT-23)	N (PDIP)	NS (SO)	PW (TSSOP)	
		14 PINS	14 PINS	14 PINS	14 PINS	14 PINS	14 PINS	
$R_{\theta JA}$	Junction-to-ambient thermal resistance	86	96	124.1	80	76	113	°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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4.4 Electrical Characteristics

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

PARAMETER	TEST CONDITIONS		V_{CC}	T_A = 25°C			SN54HC393		SN74HC393		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
V_{OH}	V_I = V_{IH} or V_{IL}	I_{OH} = -20 µA	2 V	1.9	1.998		1.9		1.9		V
			4.5 V	4.4	4.499		4.4		4.4		
			6 V	5.9	5.999		5.9		5.9		
		I_{OH} = -4 mA	4.5 V	3.98	4.3		3.7		3.84		
		I_{OH} = -5.2 mA	6 V	5.48	5.8		5.2		5.34		
V_{OL}	V_I = V_{IH} or V_{IL}	I_{OL} = 20 µA	2 V		0.002	0.1		0.1		0.1	V
			4.5 V		0.001	0.1		0.1		0.1	
			6		0.001	0.1		0.1		0.1	
		I_{OL} = 4 mA	4.5 V		0.17	0.26		0.4		0.33	
		I_{OL} = 5.2 mA	6 V		0.15	0.26		0.4		0.33	
I_I	V_I = V_{CC} or 0		6 V		±0.1	±100		±1000		±1000	nA
I_{CC}	V_I = V_{CC} or 0	I_O = 0	6 V			8		160		80	µA
C_i			2 V to 6 V		3	10		10		10	pF

4.5 Timing Requirements

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

PARAMETER			V_{CC}	T_A = 25°C		SN54HC393		SN74HC393		UNIT
				MIN	MAX	MIN	MAX	MIN	MAX	
f_{clock}	Clock frequency		2 V		6		4.2		5	MHz
			4.5 V		31		21		25	
			6 V		36		25		28	
t_w	Pulse duration	CLK high or low	2 V	80		120		100		ns
			4.5 V	16		24		20		
			6 V	14		20		18		
		CLR high	2 V	80		120		100		
			4.5 V	16		24		20		
			6 V	14		20		18		
t_{su}	Setup time, CLR inactive		2 V	25		25		25		ns
			4.5 V	5		5		5		
			6 V	5		5		5		

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4.6 Switching Characteristics

over recommended operating free-air temperature range, C_L = 50 pF (unless otherwise noted) (Figure 5-1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CC}	T_A = 25°C			SN54HC393		SN74HC393		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
f_{max}	CLK	Q_A	2 V	6	10		4.2		5		MHz
			4.5 V	31	50		21		25		
			6 V	36	60		25		28		
t_{pd}	CLK	Q_A	2 V		50	120		180		150	ns
			4.5 V		15	24		36		30	
			6 V		13	20		31		26	
		Q_B	2 V		72	190		285		240	
			4.5 V		22	38		57		47	
			6 V		18	32		48		40	
		Q_C	2 V		91	240		360		300	
			4.5 V		28	48		72		60	
			6 V		22	41		61		51	
		Q_D	2 V		100	290		430		360	
			4.5 V		32	58		87		72	
			6 V		24	50		74		62	
t_{PHL}	CLR	Any	2 V		45	165		250		205	
			4.5 V		17	33		49		41	
			6 V		14	28		42		35	
t_t		Any	2 V		28	75		110		95	ns
			4.5 V		8	15		22		19	
			6 V		6	13		19		16	

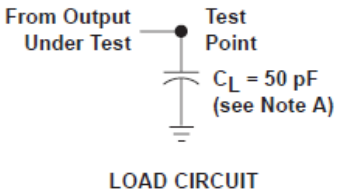
4.7 Operating Characteristics

T_A = 25°C

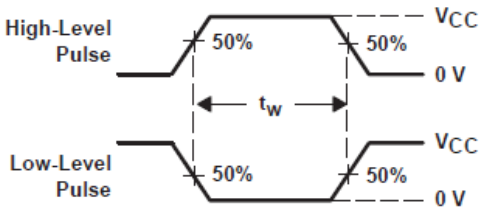
PARAMETER		TEST CONDITIONS	TYP	UNIT
C_{PD}	Power dissipation capacitance	No load	40	pF

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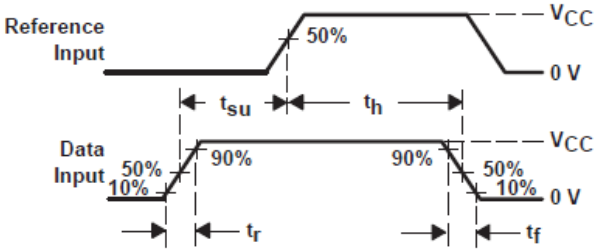
5 Parameter Measurement Information



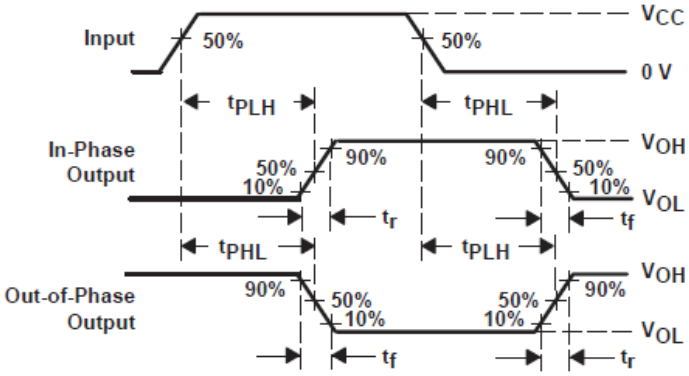
LOAD CIRCUIT



VOLTAGE WAVEFORMS
PULSE DURATIONS



VOLTAGE WAVEFORMS
SETUP AND HOLD AND INPUT RISE AND FALL TIMES



VOLTAGE WAVEFORMS
PROPAGATION DELAY AND OUTPUT TRANSITION TIMES

A. C_L includes probe and test-fixture capacitance.
B. Phase relationships between waveforms were chosen arbitrarily. All input pulses are supplied by generators having the following characteristics: PRR ≤ 1 MHz, Z_O = 50 Ω, t_r = 6 ns, t_f = 6 ns.
C. For clock inputs, f_{max} is measured when the input duty cycle is 50%.
D. The outputs are measured one at a time with one input transition per measurement.
E. t_{PLH} and t_{PHL} are the same as t_{pd}.

Figure 5-1. Load Circuit and Voltage Waveforms

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6 Detailed Description

6.1 Overview

The ’HC393 devices contain eight flip-flops and additional gating to implement two individual 4-bit counters in a single package. These devices comprise two independent 4-bit binary counters, each having a clear (CLR) and a clock (CLK) input. N-bit binary counters can be implemented with each package, providing the capability of divide by 256. The ’HC393 devices have parallel outputs from each counter stage so that any submultiple of the input count frequency is available for system timing signals.

6.2 Functional Block Diagram

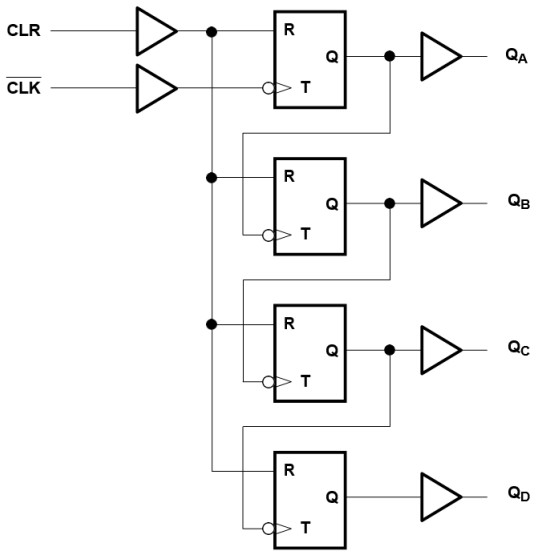


Figure 6-1. Logic Diagram, Each Counter (Positive Logic)

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6.3 Device Functional Modes

Table 6-1. Function Table Count Sequence (Each Buffer)

COUNT	OUTPUTS			
	Q_D	Q_C	Q_B	Q_A
0	L	L	L	L
1	L	L	L	H
2	L	L	H	L
3	L	L	H	H
4	L	H	L	L
5	L	H	L	H
6	L	H	H	L
7	L	H	H	H
8	H	L	L	L
9	H	L	L	H
10	H	L	H	L
11	H	L	H	H
12	H	H	L	L
13	H	H	L	H
14	H	H	H	L
15	H	H	H	H

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7 Application and Implementation

Note

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.

7.1 Power Supply Recommendations

The power supply can be any voltage between the minimum and maximum supply voltage rating located in the *Recommended Operating Conditions*. Each V_{CC} terminal should have a good bypass capacitor to prevent power disturbance. A 0.1µF capacitor is recommended for this device. It is acceptable to parallel multiple bypass capacitors to reject different frequencies of noise. The 0.1µF and 1µF capacitors are commonly used in parallel. The bypass capacitor should be installed as close to the power terminal as possible for best results.

7.2 Layout

7.2.1 Layout Guidelines

- Bypass capacitor placement
  - Place near the positive supply terminal of the device
  - Provide an electrically short ground return path
  - Use wide traces to minimize impedance
  - Keep the device, capacitors, and traces on the same side of the board whenever possible
- Signal trace geometry
  - 8mil to 12mil trace width
  - Lengths less than 12cm to minimize transmission line effects
  - Avoid 90° corners for signal traces
  - Use an unbroken ground plane below signal traces
  - Flood fill areas around signal traces with ground
  - For traces longer than 12cm
    - Use impedance controlled traces
    - Source-terminate using a series damping resistor near the output
    - Avoid branches; buffer signals that must branch separately

7.2.2 Layout Example

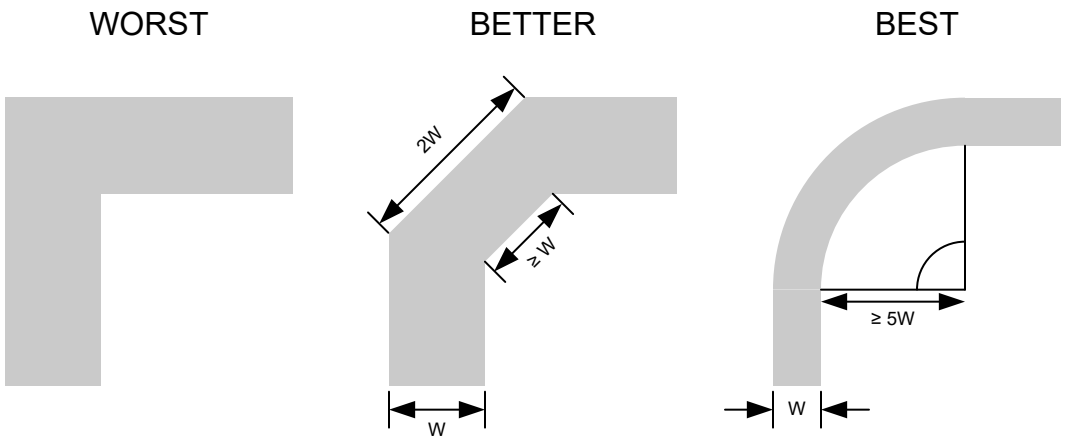


Figure 7-1. Example Trace Corners for Improved Signal Integrity

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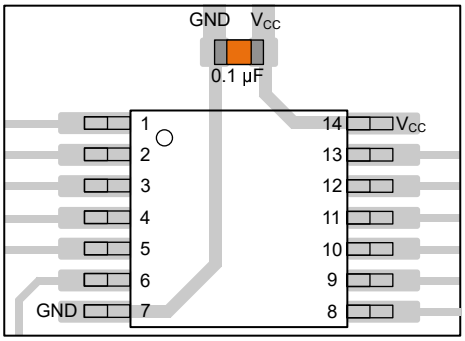


Figure 7-2. Example Bypass Capacitor Placement for TSSOP and Similar Packages

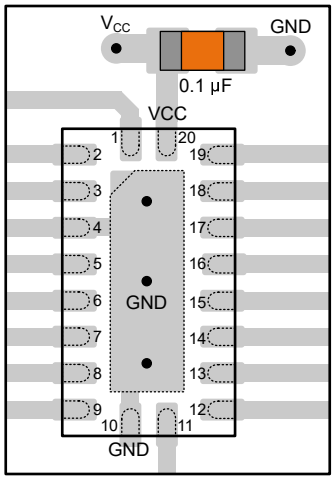


Figure 7-3. Example Bypass Capacitor Placement for WQFN and Similar Packages

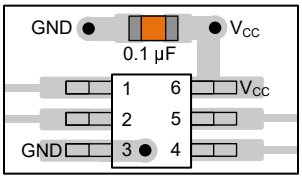


Figure 7-4. Example Bypass Capacitor Placement for SOT, SC70 and Similar Packages

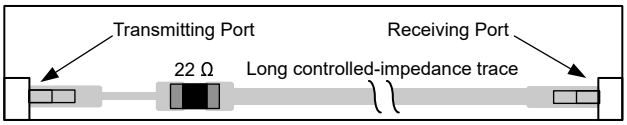


Figure 7-5. Example Damping Resistor Placement for Improved Signal Integrity

8 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.

8.1 Documentation Support

8.1.1 Related Documentation

8.2 Receiving Notification of Documentation Updates

To receive notification of documentation updates, navigate to the device product folder on ti.com. Click on *Notifications* to register and receive a weekly digest of any product information that has changed. For change details, review the revision history included in any revised document.

8.3 Support Resources

TI E2E™ support forums are an engineer's go-to source for fast, verified answers and design help — straight from the experts. Search existing answers or ask your own question to get the quick design help you need.

Linked content is provided "AS IS" by the respective contributors. They do not constitute TI specifications and do not necessarily reflect TI's views; see TI's Terms of Use.

8.4 Trademarks

TI E2E™ is a trademark of Texas Instruments.
All trademarks are the property of their respective owners.

8.5 Electrostatic Discharge Caution



This integrated circuit can be damaged by ESD. Texas Instruments recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage.

ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

8.6 Glossary

TI Glossary	This glossary lists and explains terms, acronyms, and definitions.

9 Revision History

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

Changes from Revision D (July 2003) to Revision E (December 2024)	Page
• Added *Device Information* table, *Pin Functions* table, *Thermal Information* table, *Device Functional Modes,*Application and Implementation section, *Device and Documentation Support* section, and *Mechanical, Packaging, and Orderable Information* section	1
• Added DYY package to *Device Information* table, *Pin Functions and Configuration* section, and *Thermal Information* table	1

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 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)
84100012A	Active	Production	LCCC (FK) | 20	55 | TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	84100012A SNJ54HC 393FK
8410001CA	Active	Production	CDIP (J) | 14	25 | TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	8410001CA SNJ54HC393J
8410001DA	Active	Production	CFP (W) | 14	25 | TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	8410001DA SNJ54HC393W
JM38510/66309BCA	Active	Production	CDIP (J) | 14	25 | TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	JM38510/ 66309BCA
JM38510/66309BCA.A	Active	Production	CDIP (J) | 14	25 | TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	JM38510/ 66309BCA
M38510/66309BCA	Active	Production	CDIP (J) | 14	25 | TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	JM38510/ 66309BCA
SN54HC393J	Active	Production	CDIP (J) | 14	25 | TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	SN54HC393J
SN54HC393J.A	Active	Production	CDIP (J) | 14	25 | TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	SN54HC393J
SN74HC393D	Obsolete	Production	SOIC (D) | 14	-	-	Call TI	Call TI	-40 to 85	HC393
SN74HC393DBR	Active	Production	SSOP (DB) | 14	2000 | LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC393
SN74HC393DBR.A	Active	Production	SSOP (DB) | 14	2000 | LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC393
SN74HC393DR	Active	Production	SOIC (D) | 14	2500 | LARGE T&R	Yes	NIPDAU | SN	Level-1-260C-UNLIM	-40 to 85	HC393
SN74HC393DR.A	Active	Production	SOIC (D) | 14	2500 | LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC393
SN74HC393DT	Obsolete	Production	SOIC (D) | 14	-	-	Call TI	Call TI	-40 to 85	HC393
SN74HC393N	Active	Production	PDIP (N) | 14	25 | TUBE	Yes	NIPDAU	N/A for Pkg Type	-40 to 85	SN74HC393N
SN74HC393N.A	Active	Production	PDIP (N) | 14	25 | TUBE	Yes	NIPDAU	N/A for Pkg Type	-40 to 85	SN74HC393N
SN74HC393NSR	Active	Production	SOP (NS) | 14	2000 | LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC393
SN74HC393NSR.A	Active	Production	SOP (NS) | 14	2000 | LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC393
SN74HC393PW	Obsolete	Production	TSSOP (PW) | 14	-	-	Call TI	Call TI	-40 to 85	HC393
SN74HC393PWR	Active	Production	TSSOP (PW) | 14	2000 | LARGE T&R	Yes	NIPDAU | SN	Level-1-260C-UNLIM	-40 to 85	HC393
SN74HC393PWR.A	Active	Production	TSSOP (PW) | 14	2000 | LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC393
SN74HC393PWR1G4	Active	Production	TSSOP (PW) | 14	2000 | LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC393
SN74HC393PWT	Obsolete	Production	TSSOP (PW) | 14	-	-	Call TI	Call TI	-40 to 85	HC393

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)
SN74HCS393DYYR	Active	Production	SOT-23-THIN (DYY) | 14	3000 | LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 125	HCS393
SN74HCS393DYYR.A	Active	Production	SOT-23-THIN (DYY) | 14	3000 | LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 125	HCS393
SNJ54HC393FK	Active	Production	LCCC (FK) | 20	55 | TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	84100012A SNJ54HC 393FK
SNJ54HC393FK.A	Active	Production	LCCC (FK) | 20	55 | TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	84100012A SNJ54HC 393FK
SNJ54HC393J	Active	Production	CDIP (J) | 14	25 | TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	8410001CA SNJ54HC393J
SNJ54HC393J.A	Active	Production	CDIP (J) | 14	25 | TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	8410001CA SNJ54HC393J
SNJ54HC393W	Active	Production	CFP (W) | 14	25 | TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	8410001DA SNJ54HC393W
SNJ54HC393W.A	Active	Production	CFP (W) | 14	25 | TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	8410001DA SNJ54HC393W

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

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

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

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

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

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

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

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

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

OTHER QUALIFIED VERSIONS OF SN54HC393, SN74HC393 :

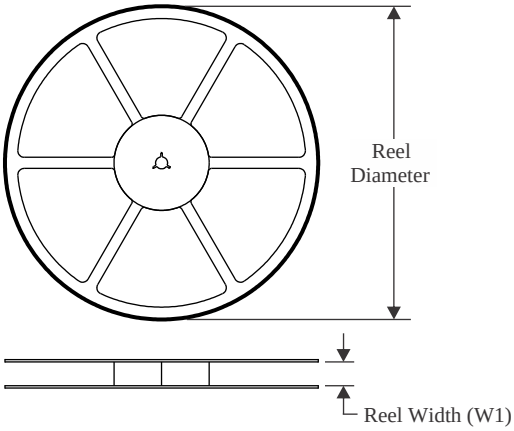
- Catalog : SN74HC393
- Military : SN54HC393

NOTE: Qualified Version Definitions:

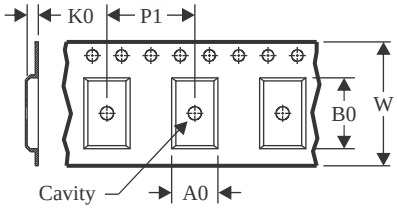
- Catalog - TI's standard catalog product
- Military - QML certified for Military and Defense Applications

TAPE AND REEL INFORMATION

REEL DIMENSIONS

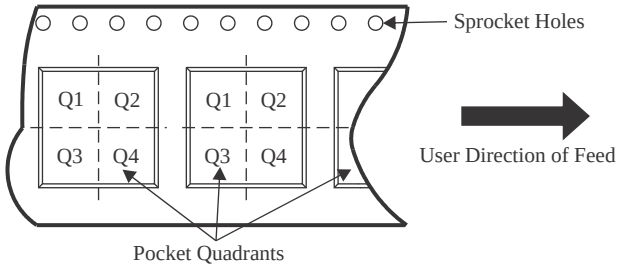


TAPE DIMENSIONS



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

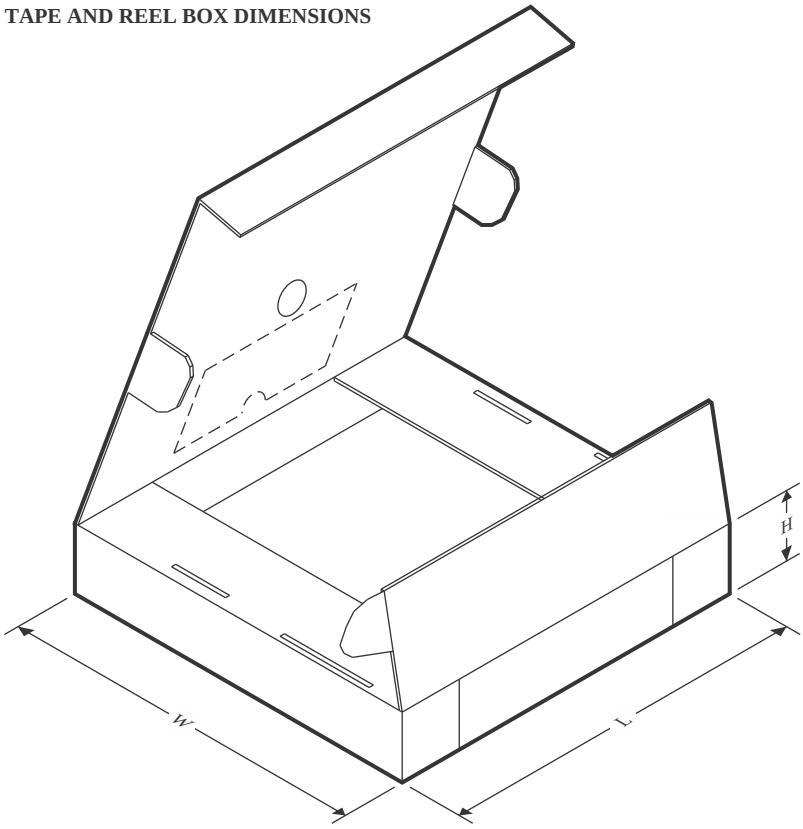
QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*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
SN74HC393DBR	SSOP	DB	14	2000	330.0	16.4	8.35	6.6	2.4	12.0	16.0	Q1
SN74HC393DR	SOIC	D	14	2500	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1
SN74HC393NSR	SOP	NS	14	2000	330.0	16.4	8.1	10.4	2.5	12.0	16.0	Q1
SN74HC393NSR	SOP	NS	14	2000	330.0	16.4	8.45	10.55	2.5	12.0	16.2	Q1
SN74HC393PWR	TSSOP	PW	14	2000	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1
SN74HC393PWR	TSSOP	PW	14	2000	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1
SN74HC393PWR1G4	TSSOP	PW	14	2000	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1
SN74HCS393DYYR	SOT-23-THIN	DYY	14	3000	330.0	12.4	4.8	3.6	1.6	8.0	12.0	Q3

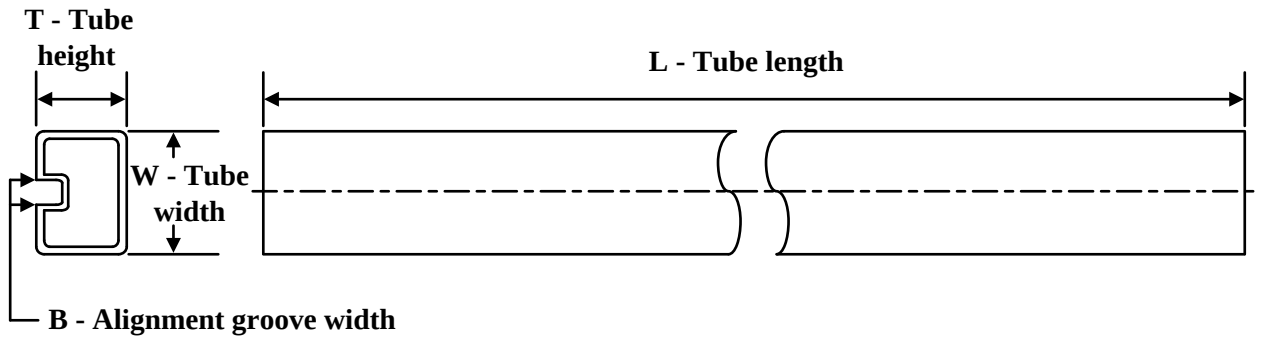
TAPE AND REEL BOX DIMENSIONS



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74HC393DBR	SSOP	DB	14	2000	353.0	353.0	32.0
SN74HC393DR	SOIC	D	14	2500	353.0	353.0	32.0
SN74HC393NSR	SOP	NS	14	2000	353.0	353.0	32.0
SN74HC393NSR	SOP	NS	14	2000	353.0	353.0	32.0
SN74HC393PWR	TSSOP	PW	14	2000	356.0	356.0	35.0
SN74HC393PWR	TSSOP	PW	14	2000	353.0	353.0	32.0
SN74HC393PWR1G4	TSSOP	PW	14	2000	356.0	356.0	35.0
SN74HCS393DYYR	SOT-23-THIN	DYY	14	3000	336.6	336.6	31.8

TUBE



*All dimensions are nominal

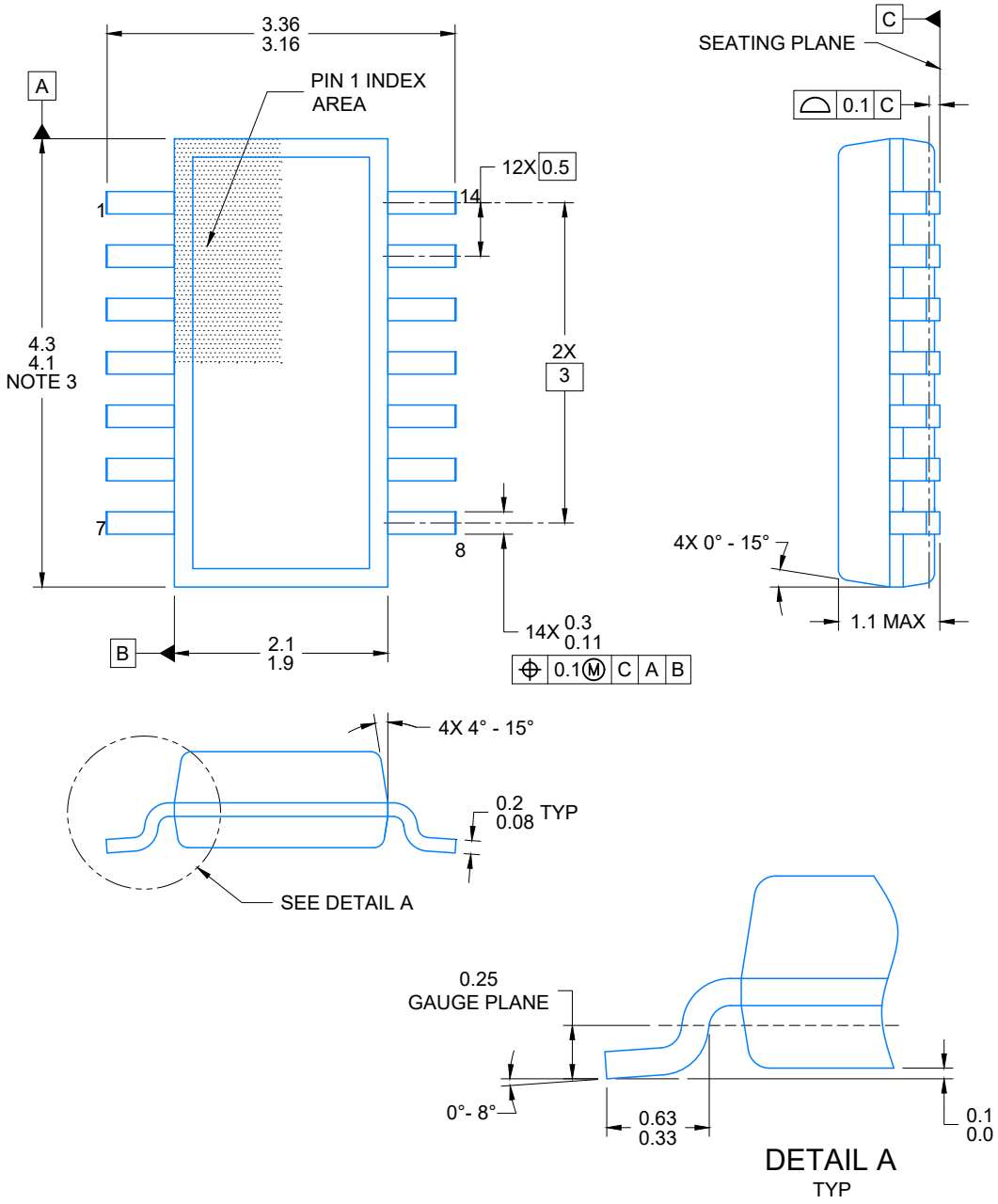
Device	Package Name	Package Type	Pins	SPQ	L (mm)	W (mm)	T (µm)	B (mm)
84100012A	FK	LCCC	20	55	506.98	12.06	2030	NA
8410001DA	W	CFP	14	25	506.98	26.16	6220	NA
SN74HC393N	N	PDIP	14	25	506	13.97	11230	4.32
SN74HC393N	N	PDIP	14	25	506	13.97	11230	4.32
SN74HC393N.A	N	PDIP	14	25	506	13.97	11230	4.32
SN74HC393N.A	N	PDIP	14	25	506	13.97	11230	4.32
SNJ54HC393FK	FK	LCCC	20	55	506.98	12.06	2030	NA
SNJ54HC393FK.A	FK	LCCC	20	55	506.98	12.06	2030	NA
SNJ54HC393W	W	CFP	14	25	506.98	26.16	6220	NA
SNJ54HC393W.A	W	CFP	14	25	506.98	26.16	6220	NA

PACKAGE OUTLINE

DYY0014A

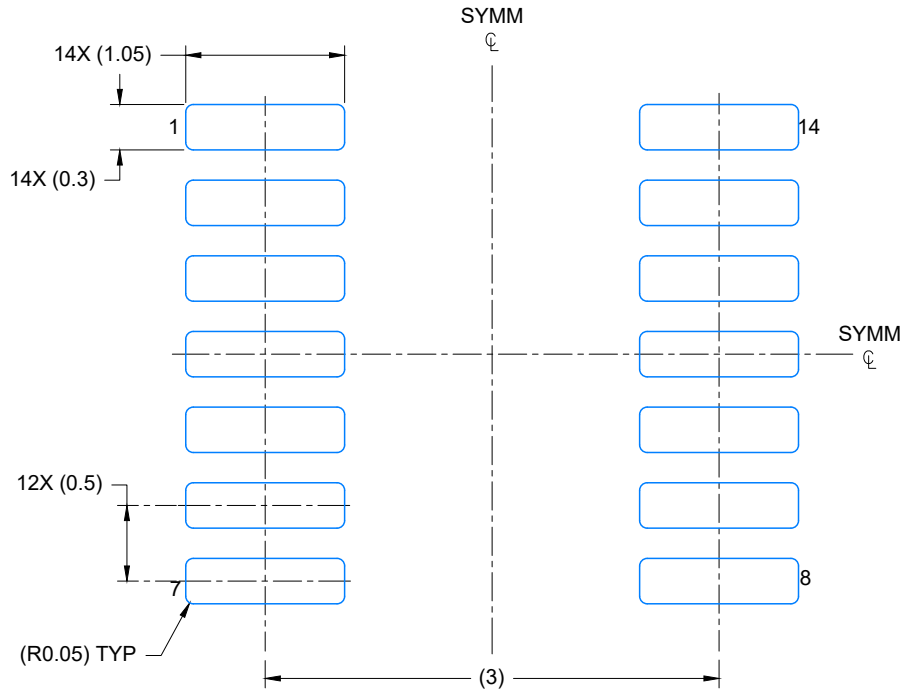
SOT-23-THIN - 1.1 mm max height

PLASTIC SMALL OUTLINE

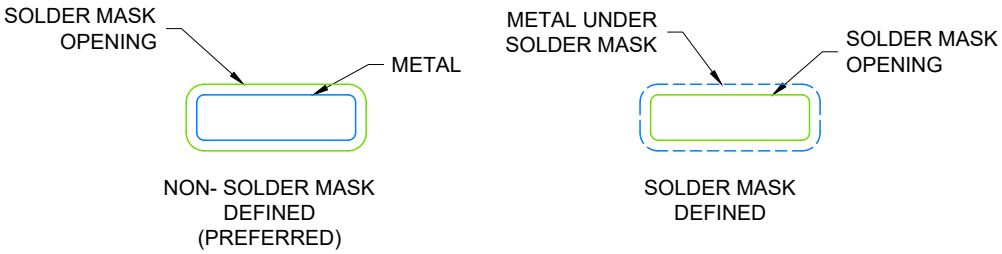


NOTES:

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 per side.
4. This dimension does not include interlead flash. Interlead flash shall not exceed 0.50 per side.
5. Reference JEDEC Registration MO-345, Variation AB



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE: 20X

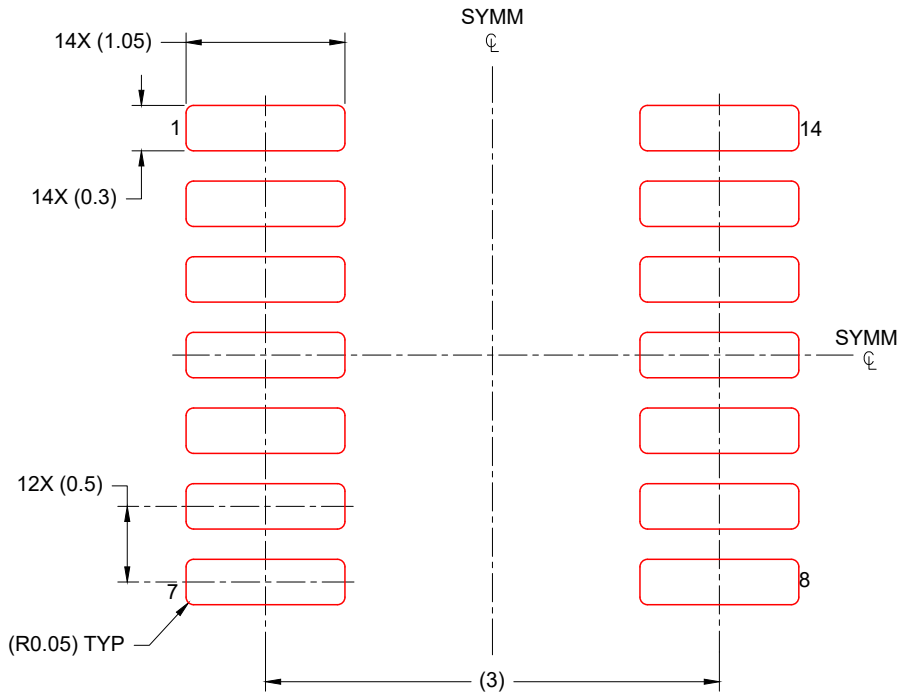


SOLDER MASK DETAILS

4224643/D 07/2024

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.

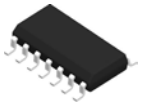


SOLDER PASTE EXAMPLE
BASED ON 0.125 mm THICK STENCIL
SCALE: 20X

4224643/D 07/2024

NOTES: (continued)

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

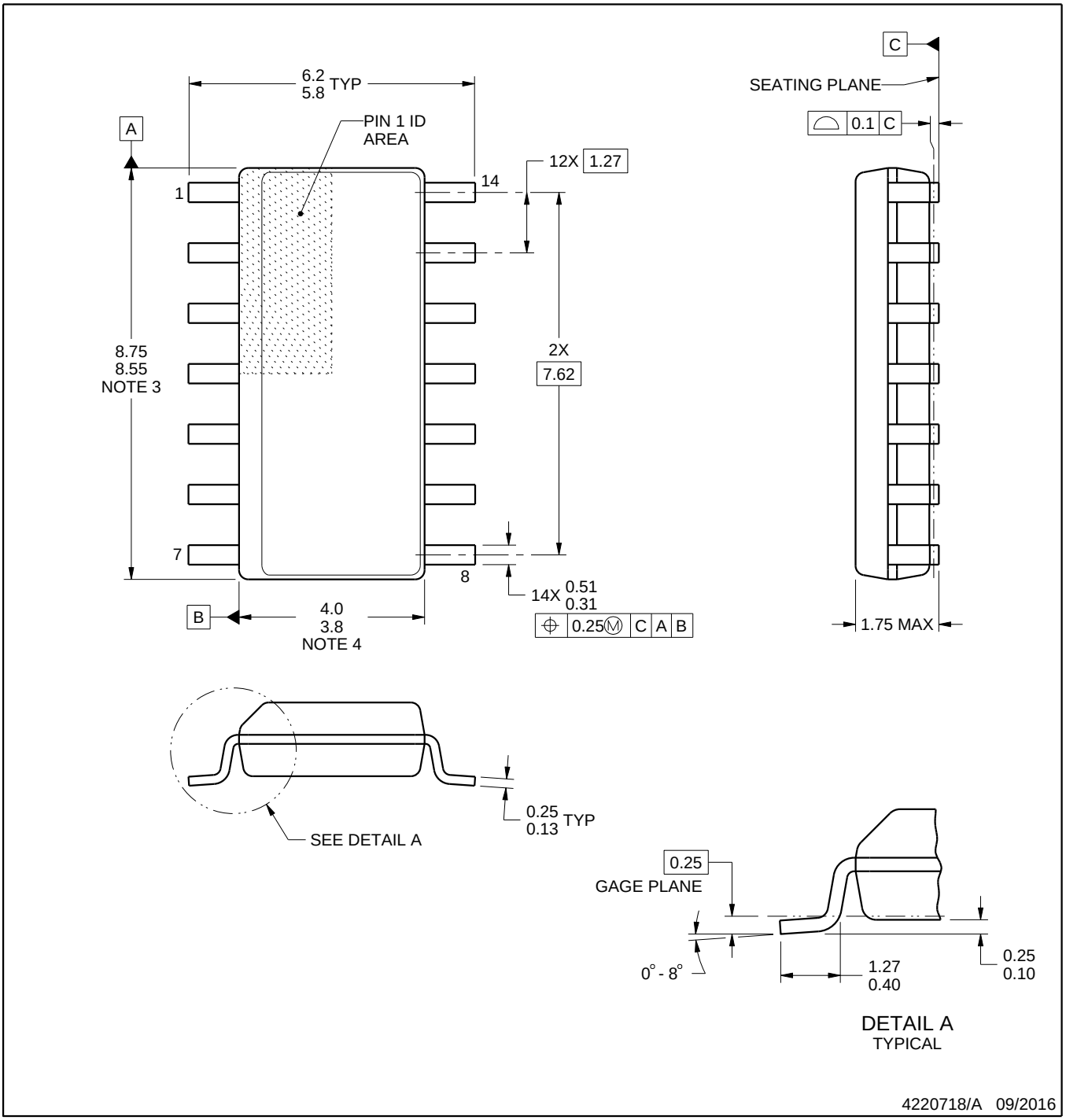


PACKAGE OUTLINE

D0014A

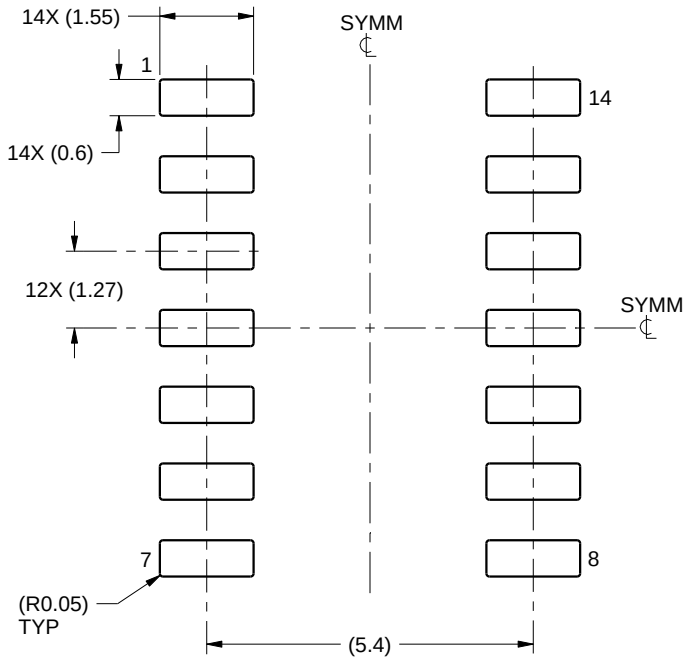
SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT

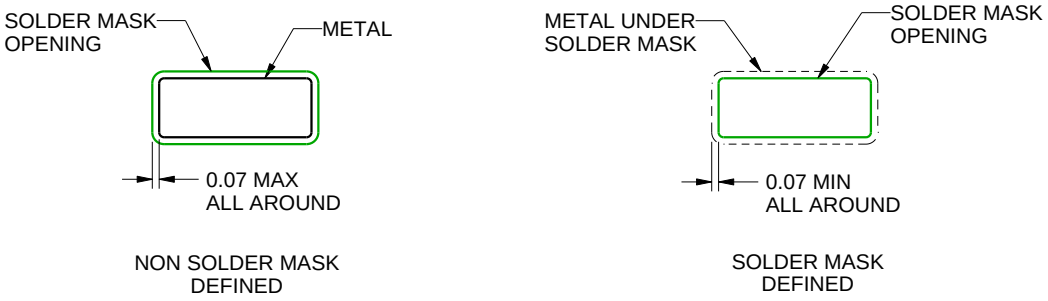


NOTES:

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)

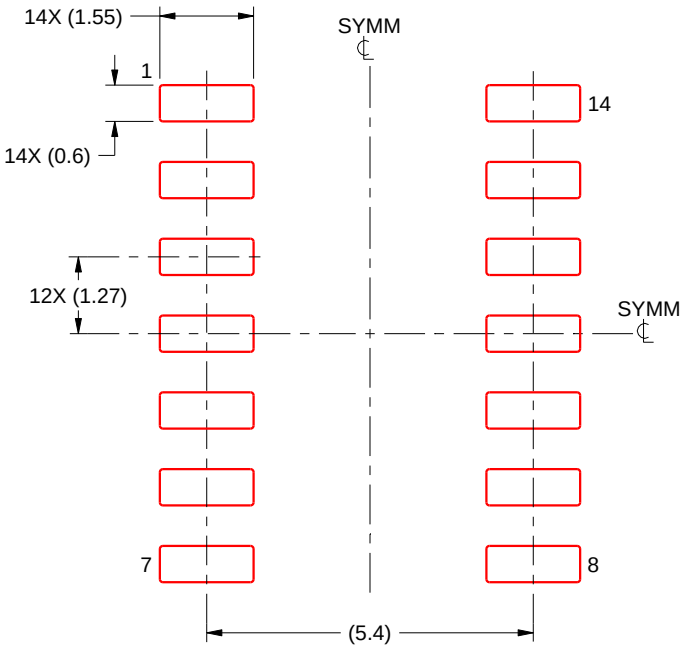
6. Publication IPC-7351 may have alternate designs.
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

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

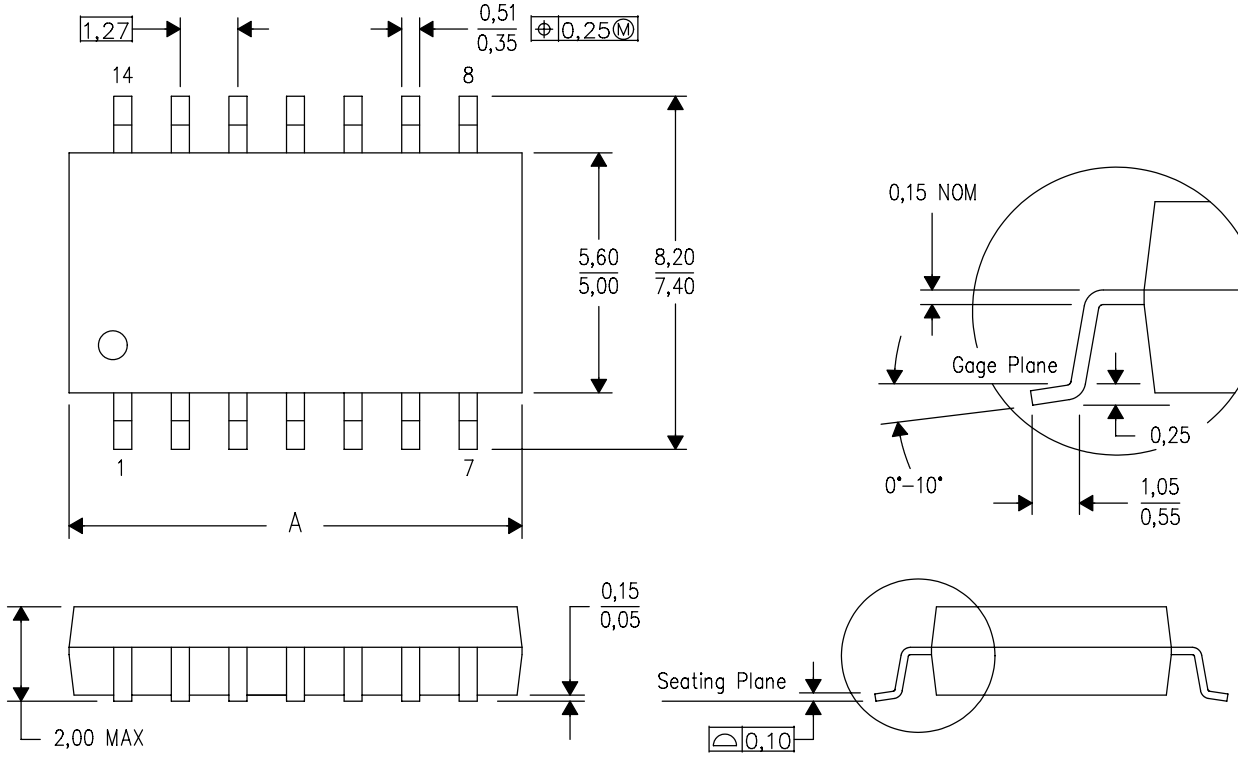
NOTES: (continued)

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.

MECHANICAL DATA

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

14-PINS SHOWN

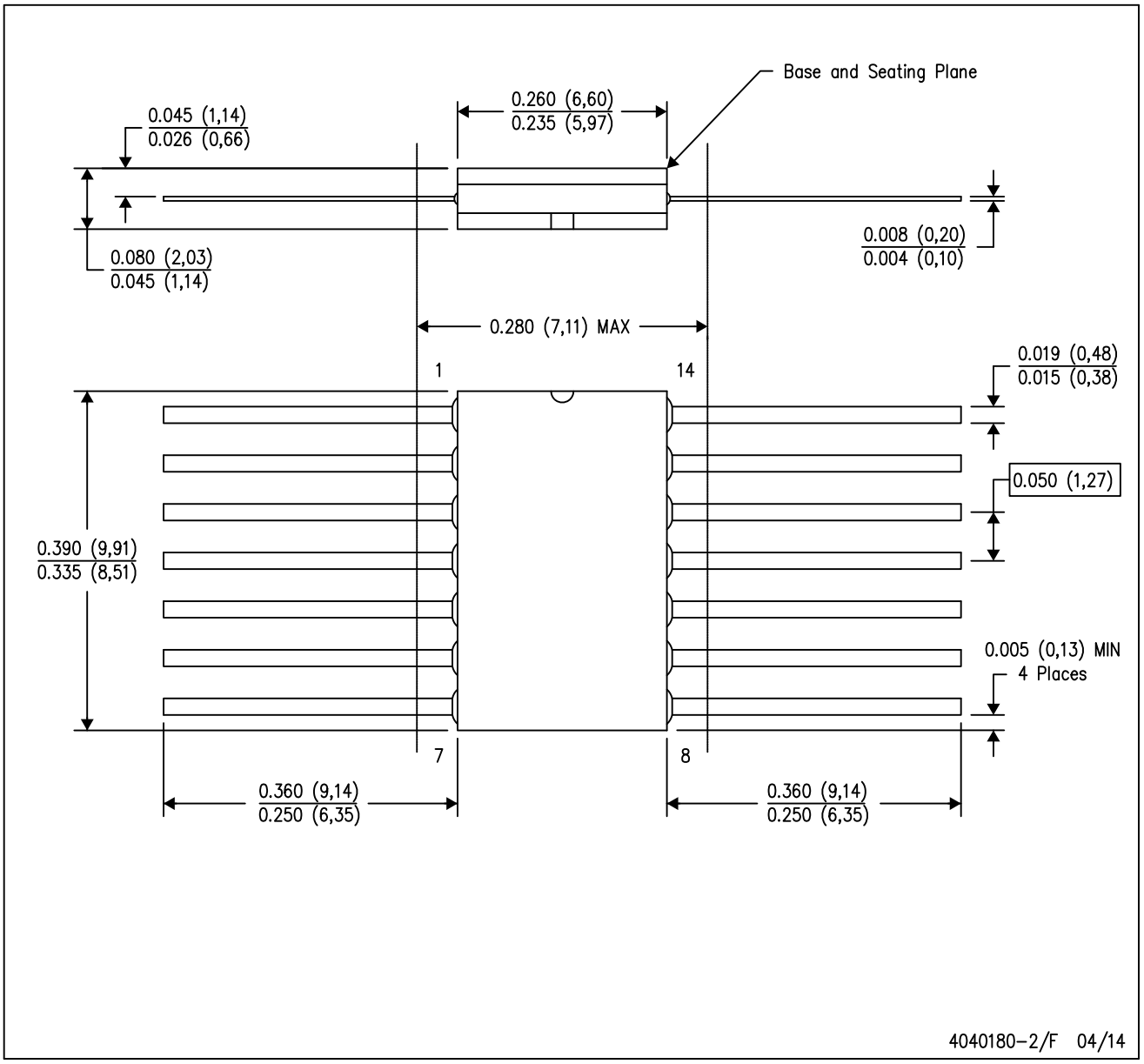


DIM \ PINS **	14	16	20	24
A MAX	10,50	10,50	12,90	15,30
A MIN	9,90	9,90	12,30	14,70

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.

W (R–GDFP–F14) CERAMIC DUAL FLATPACK



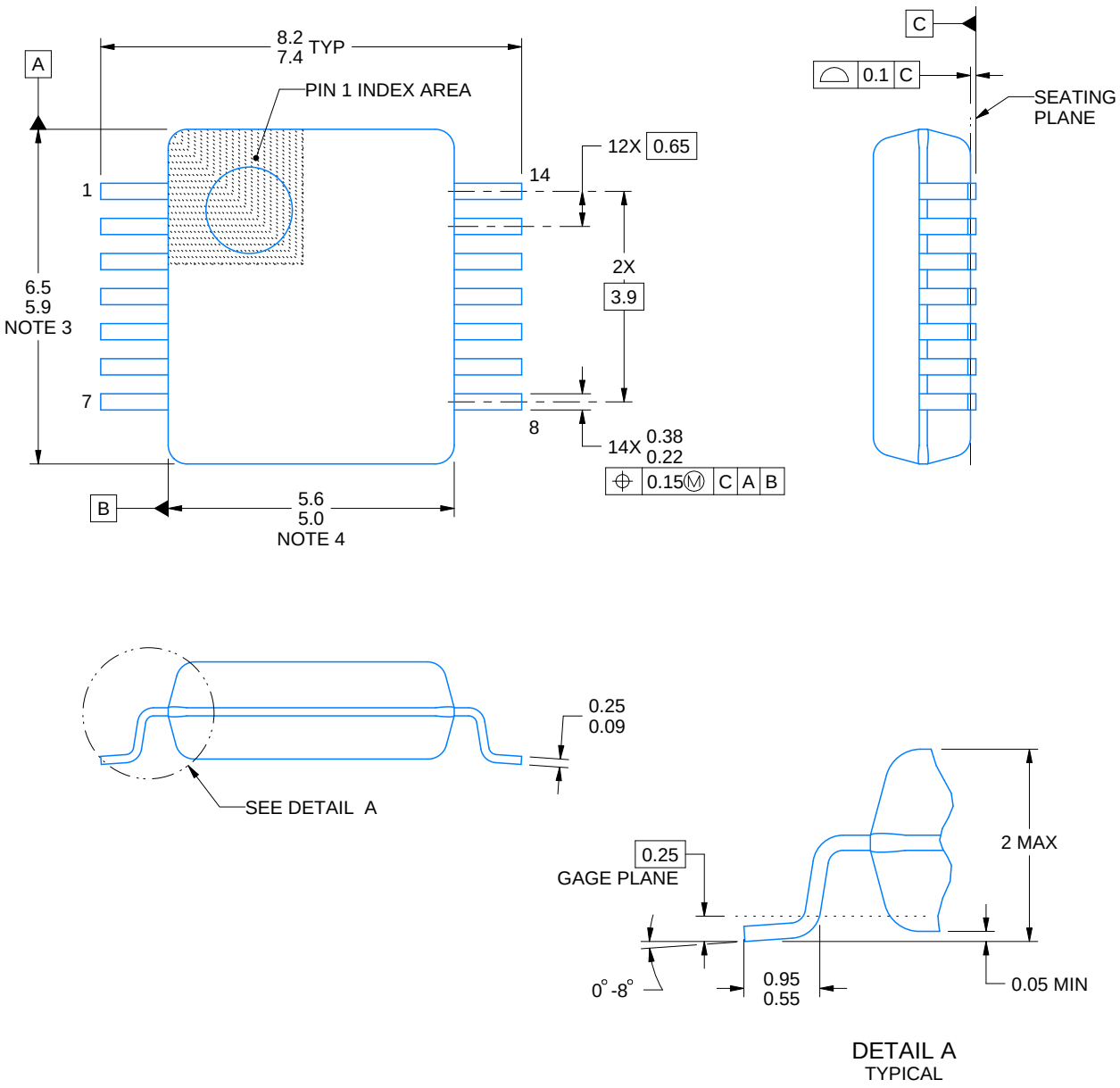
NOTES:
A. All linear dimensions are in inches (millimeters).
B. This drawing is subject to change without notice.
C. This package can be hermetically sealed with a ceramic lid using glass frit.
D. Index point is provided on cap for terminal identification only.
E. Falls within MIL STD 1835 GDFP1–F14

PACKAGE OUTLINE

DB0014A

SSOP - 2 mm max height

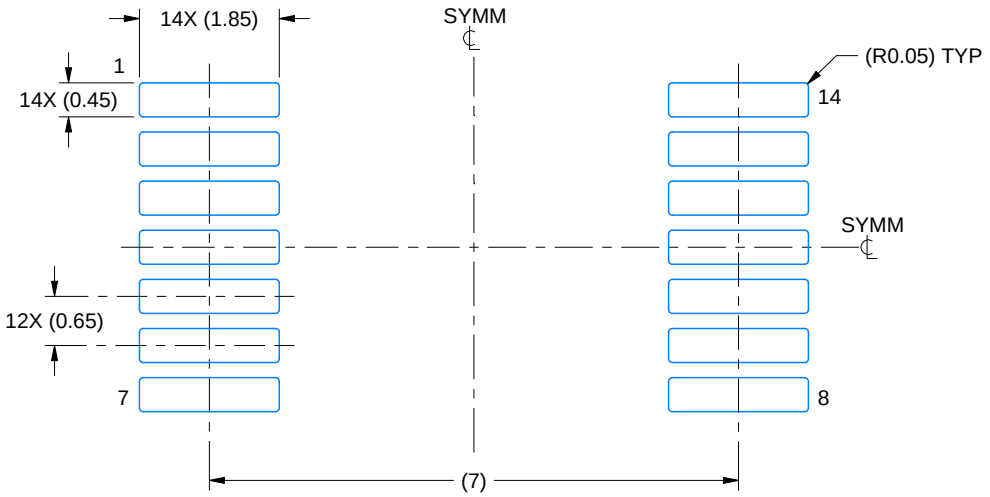
SMALL OUTLINE PACKAGE



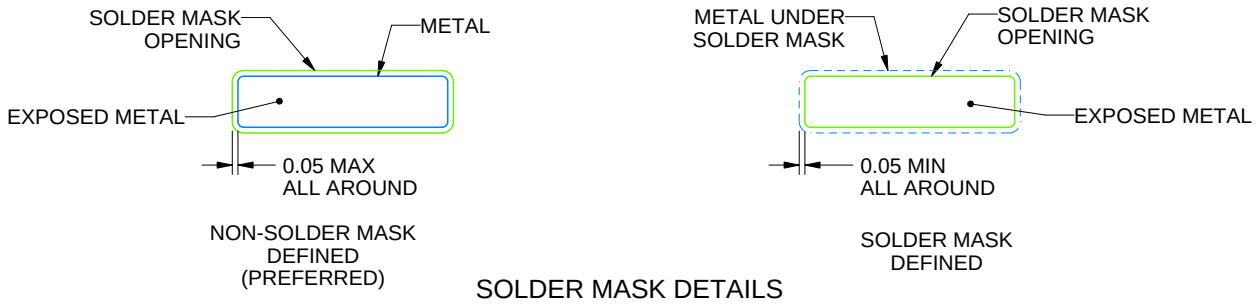
4220762/A 05/2024

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

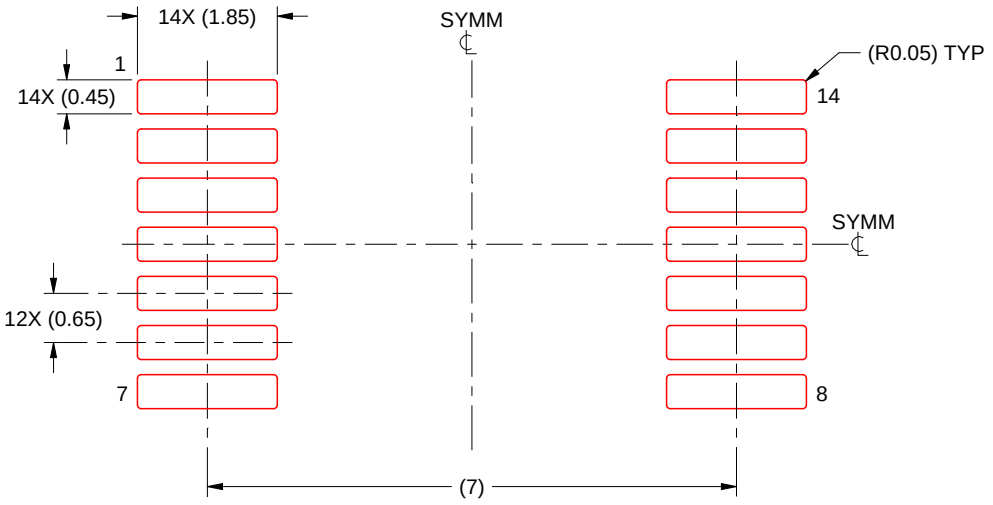


SOLDER MASK DETAILS

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

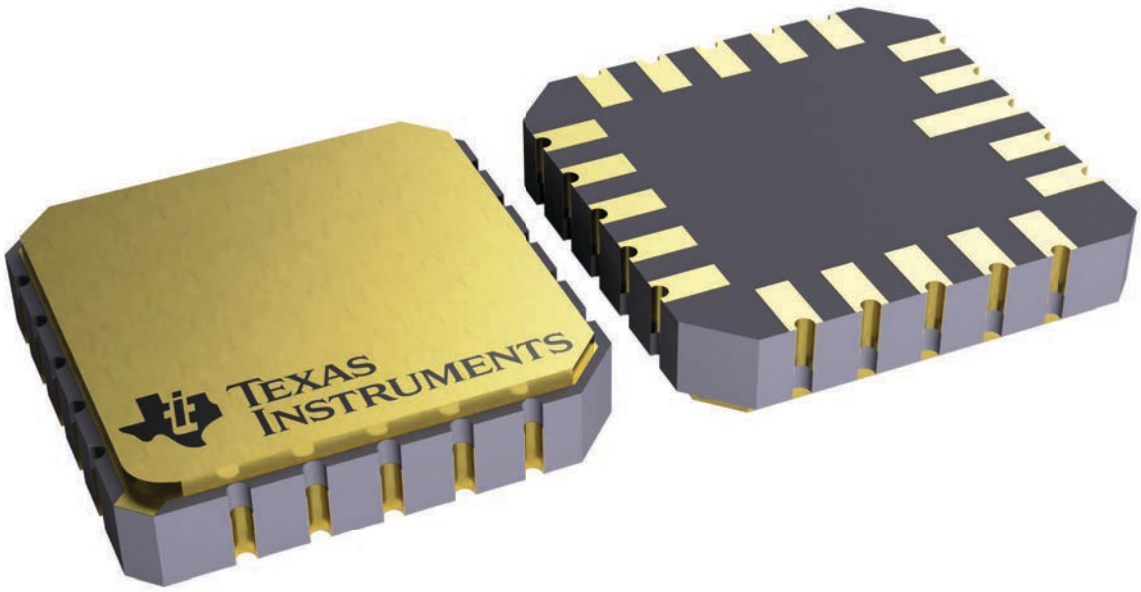
FK 20

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.

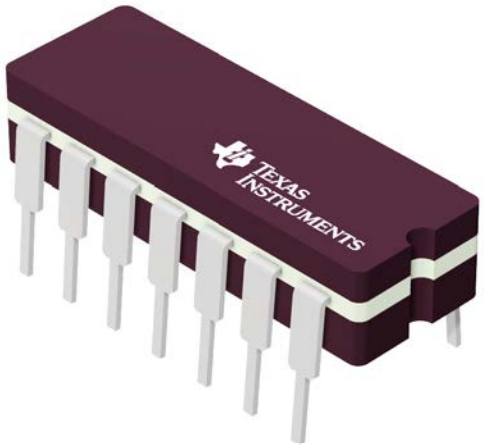


4229370VA\

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

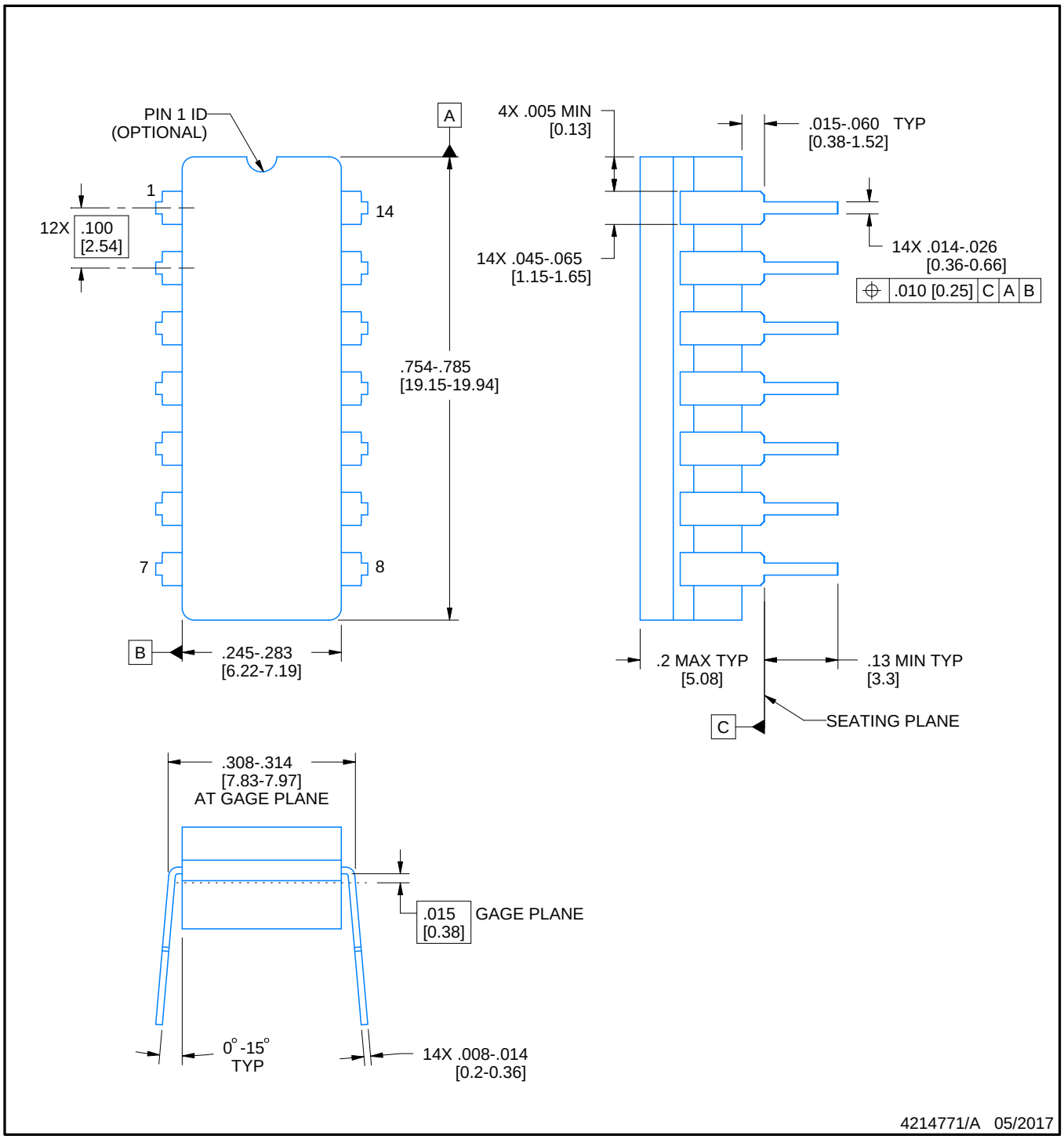


PACKAGE OUTLINE

J0014A

CDIP - 5.08 mm max height

CERAMIC DUAL IN LINE PACKAGE



NOTES:

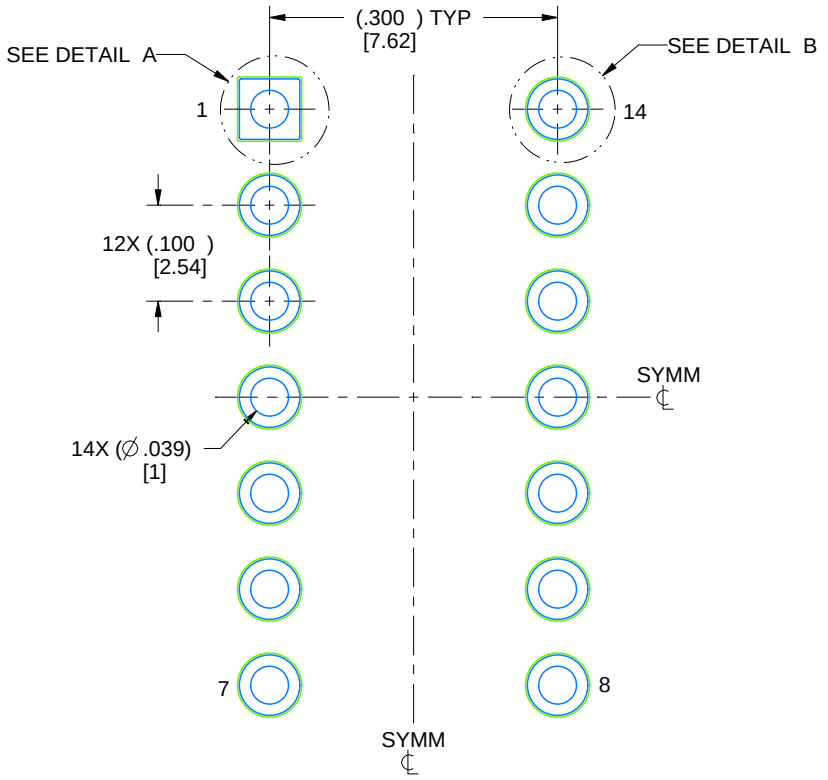
1. All controlling linear dimensions are in inches. Dimensions in brackets are in millimeters. Any dimension in brackets or parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This package is hermitically sealed with 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

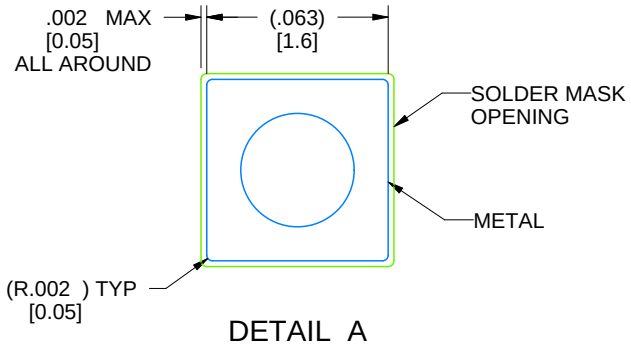
J0014A

CDIP - 5.08 mm max height

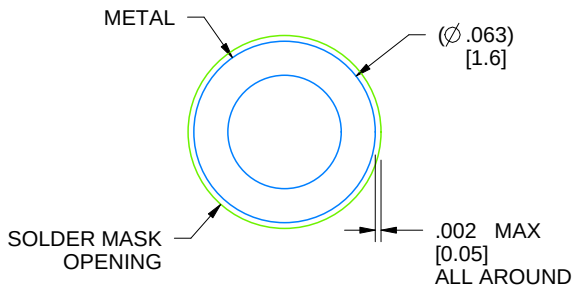
CERAMIC DUAL IN LINE PACKAGE



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



DETAIL A
SCALE: 15X



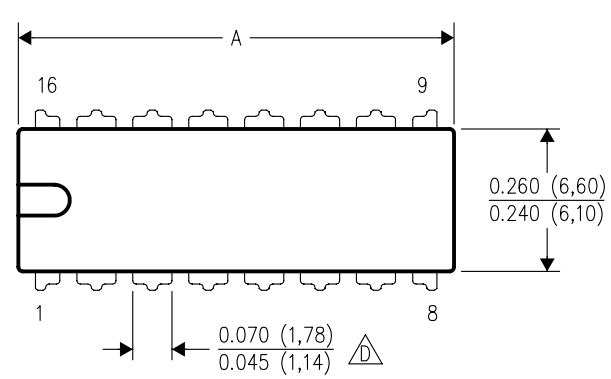
DETAIL B
13X, SCALE: 15X

4214771/A 05/2017

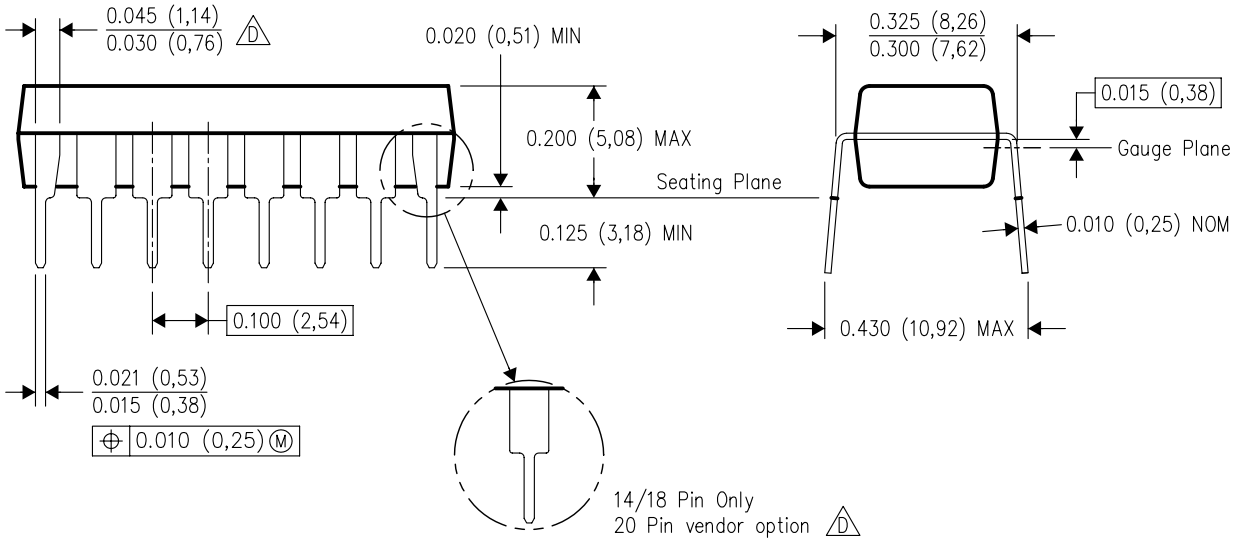
N (R–PDIP–T**)

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

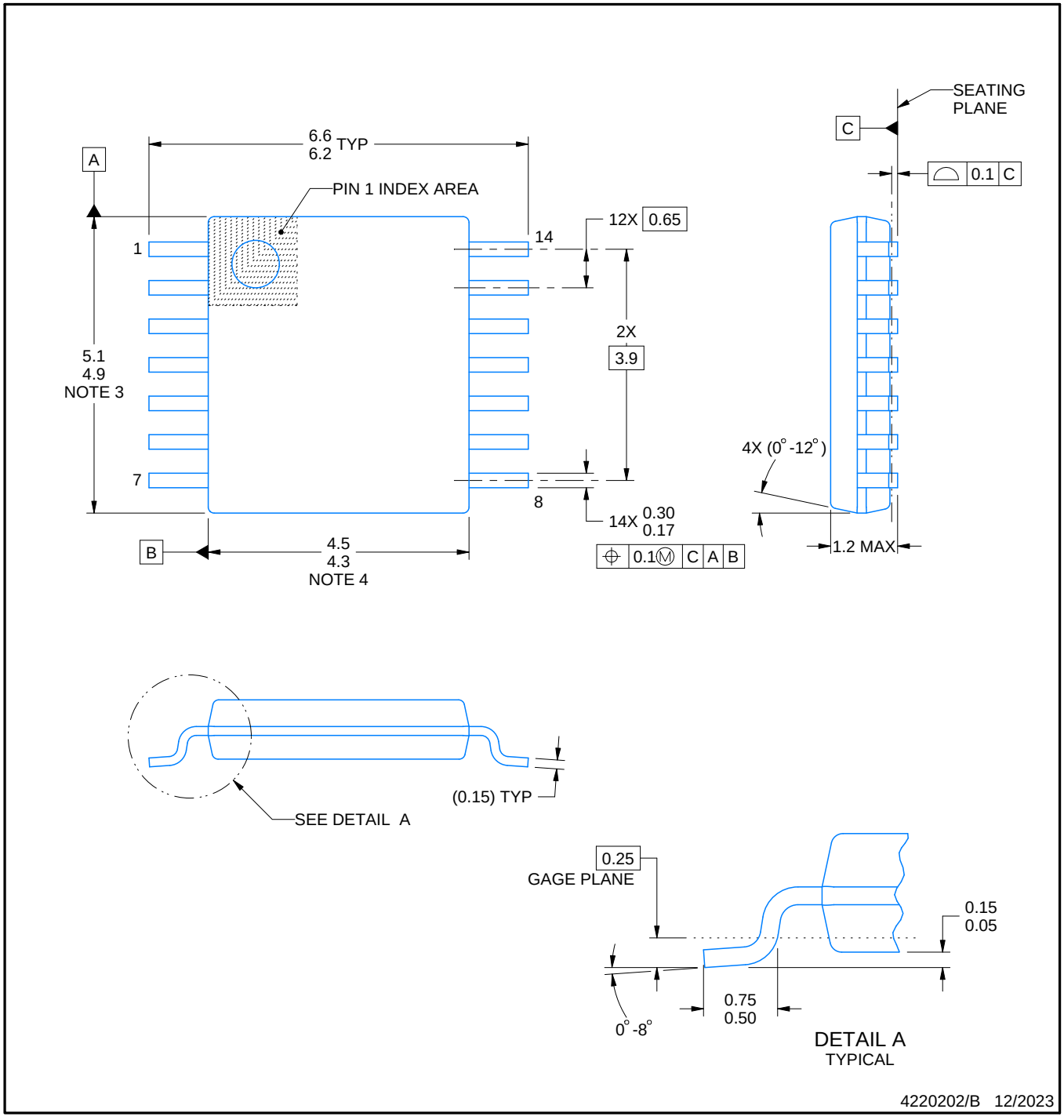
NOTES:
A. All linear dimensions are in inches (millimeters).
B. This drawing is subject to change without notice.
C. Falls within JEDEC MS–001, except 18 and 20 pin minimum body length (Dim A).
D. The 20 pin end lead shoulder width is a vendor option, either half or full width.

PACKAGE OUTLINE

PW0014A

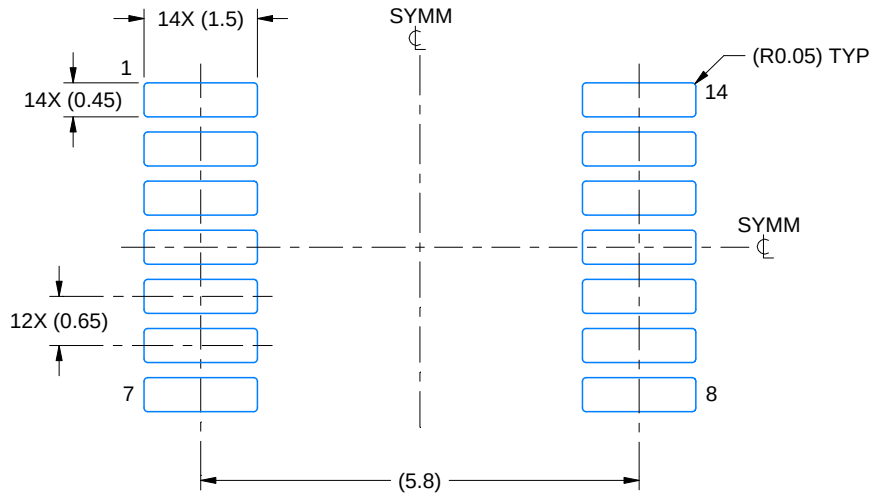
TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE

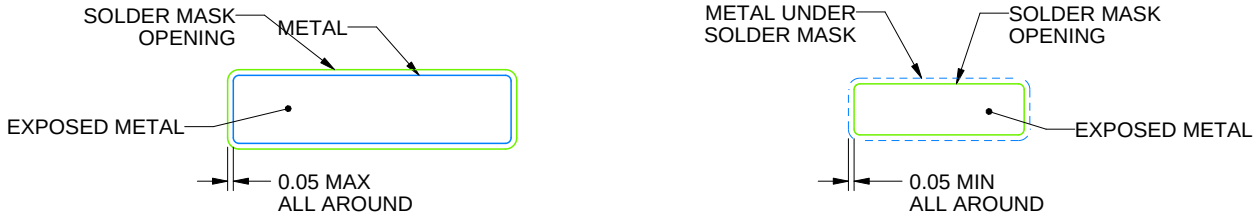


NOTES:

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

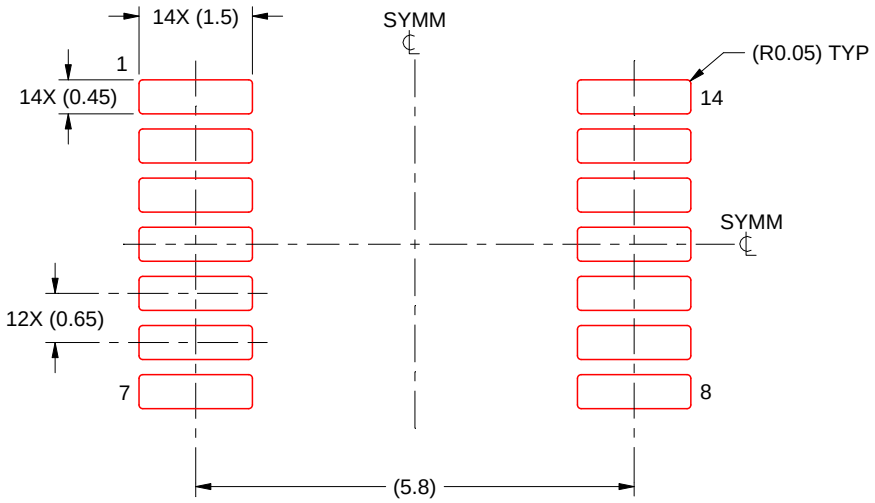


SOLDER MASK DETAILS

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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

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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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