TEXAS INSTRUMENTS
CD54HC165, CD74HC165, CD54HCT165, CD74HCT165
ZHCSPD1D – FEBRUARY 1998 – REVISED NOVEMBER 2021

CDx4HC165、CDx4HCT165 高速 CMOS 逻辑 8 位并行输入/串行输出移位寄存器

1 特性

- 缓冲输入
- 异步并行负载
- 互补输出
- 扇出（在温度范围内）
  - 标准输出：10 个 LSTTL 负载
  - 总线驱动器输出：15 个 LSTTL 负载
- 宽工作温度范围：-55℃ 至 125℃
- 平衡的传播延迟及转换时间
- 与 LSTTL 逻辑 IC 相比，可显著降低功耗
- HC 类型
  - 2 V 至 6 V 工作电压
  - 高抗噪性：当 V_{CC} = 5V 时，N_{IL} = 30%，N_{IH} = V_{CC} 的 30%
- HCT 类型
  - 4.5 V 至 5.5 V 工作电压
  - 直接 LSTTL 输入逻辑兼容性，V_{IL} = 0.8V（最大值），V_{IH} = 2V（最小值）
  - CMOS 输入兼容性，当电压为 V_{OL}、V_{OH} 时，I_I ≤ 1μA

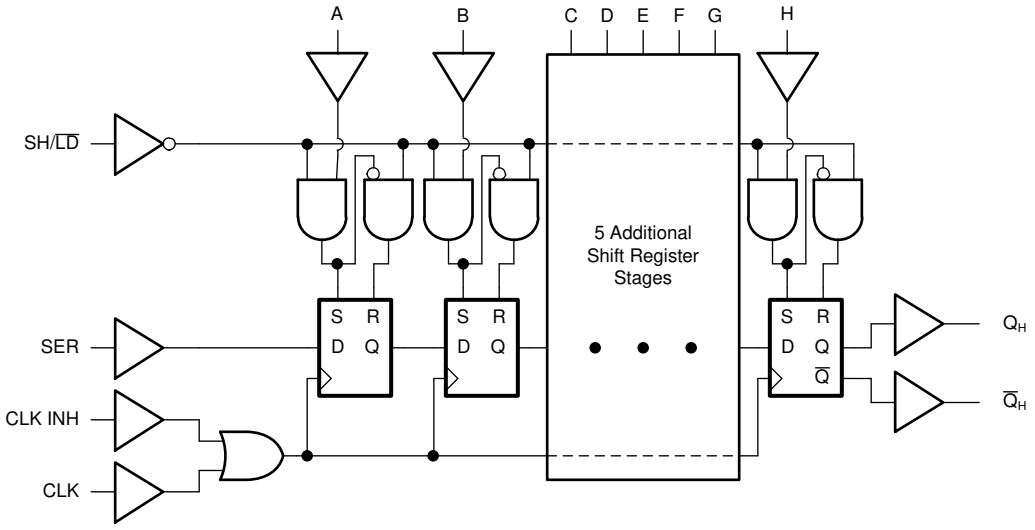
2 说明

’HC165 和 ’HCT165 是具有最后一级提供的辅助串行输出（Q_H 和 $\overline{Q}_H$）的 8 位并行或串行输入移位寄存器。当并行负载 (SH/$\overline{LD}$) 输入为低电平时，会以异步方式将从 A 输入到 H 输入的并行数据加载到寄存器中。当 SH/$\overline{LD}$ 为高电平时，数据会在 SER 输入端以串行方式输入寄存器，并通过每个正向时钟转换向右移动一个位置（A→B→C 等）。此特性通过将 Q_H 输出连接到后一器件的 SER 输入来实现并行至串行转换器扩展。

器件信息

器件型号	封装(1)	封装尺寸（标称值）
CD54HC165F3A	陶瓷双列直插封装 (CDIP) (16)	24.38mm × 6.92mm
CD74HC165M	SOIC (16)	9.90mm × 3.90mm
CD74HC165E	PDIP (16)	19.31mm × 6.35mm
CD54HCT165F3A	陶瓷双列直插封装 (CDIP) (16)	24.38mm × 6.92mm
CD74HCT165M	SOIC (16)	9.90mm × 3.90mm
CD74HCT165E	PDIP (16)	19.31mm × 6.35mm

(1) 如需了解所有可用封装，请参阅数据表末尾的可订购产品附录。



功能图

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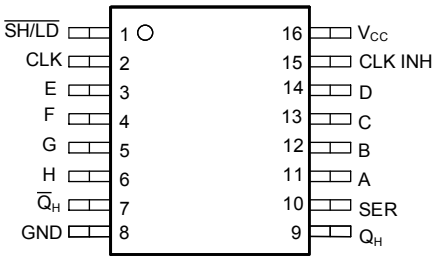
3 Revision History

注：以前版本的页码可能与当前版本的页码不同

Changes from Revision C (October 2003) to Revision D (November 2021)	Page
• 更新了整个文档中的编号、格式、表格、图和交叉参考，以反映现代数据表标准	1
• 更新了引脚名称，以符合现行的 TI 命名约定 $\overline{PL}$ 现在为 SH/$\overline{LD}$，CP 现在为 CLK，D4 现在为 E，D5 现在为 F，D6 现在为 G，D7 现在为 H，$\overline{Q}_7$ 现在为 $\overline{Q}_H$，Q_7 现在为 Q_H，DS 现在为 SER，D0 现在为 A，D1 现在为 B，D2 现在为 C，D3 现在为 D，$\overline{CE}$ 现在为 CLK INH	1

4 Pin Configuration and Functions



J, N, or D package
16-Pin CDIP, PDIP, SOIC
Top View

5 Specifications

5.1 Absolute Maximum Ratings

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

			MIN	MAX	UNIT
V_{CC}	Supply voltage		–0.5	7	V
I_{IK}	Input diode current	For V_I < -0.5 V or V_I > V_{CC} + 0.5 V		±20	mA
I_{OK}	Output diode current	For V_O < -0.5 V or V_O > V_{CC} + 0.5 V		±20	mA
IO	Drain current per output	For V_O < -0.5 V V_O > V_{CC} + 0.5 V		±25	mA
I_O	Output source or sink current per output pin	For V_O > -0.5 V or V_O < V_{CC} + 0.5 V		±25	mA
	Continuous current through V_{CC} or GND			±50	mA
T_J	Junction temperature			150	°C
T_{stg}	Storage temperature		-65	150	°C
	Lead temperature (Soldering 10s) (SOIC- Lead tips only)			300	°C

(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.

5.2 Reccomended Operating Conditions

			MIN	MAX	UNIT
V_{CC}	Supply voltage range	HC Types	2	6	V
		HCT Types	4.5	5.5	
V_I, V_O	Input or output voltage		0	V_{CC}	V
t_t	Input rise and fall time	2 V		1000	ns
		4.5 V		500	
		6 V		400	
T_A	Temperature range		–55	125	℃

5.3 Thermal Information

THERMAL METRIC		CD74HC165, CD74HCT165		UNIT
		D (SOIC)	N (PDIP)	
		16 PINS	16 PINS	
$R_{\theta JA}$	Junction-to-ambient thermal resistance(1)	73	67	°C/W

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

5.4 Electrical Characteristics

PARAMETER		TEST CONDITIONS(2)	V_{CC} (V)	25℃			-40℃ to 85℃		-55℃ to 125℃		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
HC TYPES											
V_{IH}	High level input voltage		2	1.5			1.5		1.5		V
			4.5	3.15			3.15		3.15		V
			6	4.2			4.2		4.2		V
V_{IL}	Low level input voltage		2			0.5		0.5		0.5	V
			4.5			1.35		1.35		1.35	V
			6			1.8		1.8		1.8	V
V_{OH}	High level output voltage	I_{OH} = – 20 μA	2	1.9			1.9		1.9		V
		I_{OH} = – 20 μA	4.5	4.4			4.4		4.4		V
		I_{OH} = – 20 μA	6	5.9			5.9		5.9		V
	High level output voltage	I_{OH} = – 4 mA	4.5	3.98			3.84		3.7		V
		I_{OH} = – 5.2 mA	6	5.48			5.34		5.2		V
V_{OL}	Low level output voltage	I_{OL} = 20 μA	2			0.1		0.1		0.1	V
		I_{OL} = 20 μA	4.5			0.1		0.1		0.1	V
		I_{OL} = 20 μA	6			0.1		0.1		0.1	V
	Low level output voltage	I_{OL} = 4 mA	4.5			0.26		0.33		0.4	V
		I_{OL} = 5.2 mA	6			0.26		0.33		0.4	V
I_I	Input leakage current	V_I = V_{CC} or GND	6			±0.1		±1		±1	μA
I_{CC}	Supply current	V_I = V_{CC} or GND	6			8		80		160	μA
HCT TYPES											
V_{IH}	High level input voltage		4.5 to 5.5	2			2		2		V
V_{IL}	Low level input voltage		4.5 to 5.5			0.8		0.8		0.8	V
V_{OH}	High level output voltage	I_{OH} = – 20 μA	4.5	4.4			4.4		4.4		V
	High level output voltage	I_{OH} = – 4 mA	4.5	3.98			3.84		3.7		V
V_{OL}	Low level output voltage	I_{OL} = 20 μA	4.5			0.1		0.1		0.1	V
	Low level output voltage	I_{OL} = 4 mA	4.5			0.26		0.33		0.4	V
I_I	Input leakage current	V_I = V_{CC} or GND	5.5			±0.1		±1		±1	μA
I_{CC}	Supply current	V_I = V_{CC} or GND	5.5			8		80		160	μA
ΔI_{CC} (1)	Additional quiescent device current per input pin	SER, A to H inputs held at V_{CC} – 2.1	4.5 to 5.5		100	126		157.5		171.5	μA
		CLK and SH/$\overline{LD}$ inputs held at V_{CC} – 2.1	4.5 to 5.5		100	234		292.5		318.5	

(1) For dual-supply systems theoretical worst case (V_I = 2.4 V, V_{CC} = 5.5 V) specification is 1.8 mA.
(2) V_I = V_{IH} or V_{IL}.

5.5 Prerequisite for Switching Characteristics

PARAMETER		V_{CC} (V)	25℃		-40℃ to 85℃		-55℃ to 125℃		UNIT
			MIN	MAX	MIN	MAX	MIN	MAX	
t_{WL}, t_{WH}	CLK Pulse Width	2	80		100		120		ns
		4.5	16		20		24		
		6	14		17		20		
t_{WL}	SH/$\overline{LD}$ Pulse Width	2	80		100		120		ns
		4.5	16		20		24		
		6	14		17		20		
t_{SU}	Set-up Time SER to CLK	2	80		100		120		ns
		4.5	16		20		24		
		6	14		17		20		
$t_{SU(L)}$	CLK INH to CLK	2	80		100		120		ns
		4.5	16		20		24		
		6	14		17		20		
t_{SU}	A-H to SH/$\overline{LD}$	2	80		100		120		ns
		4.5	16		20		24		
		6	14		17		20		
t_H	Hold Time SER to CLK or CLK INH	2	35		45		55		ns
		4.5	7		9		11		
		6	6		8		9		
t_H	CLK INH to CLK	2	0		0		0		ns
		4.5	0		0		0		
		6	0		0		0		
t_{REC}	Recovery Time SH/$\overline{LD}$ to CLK	2	100		125		150		ns
		4.5	20		25		30		
		6	17		21		26		
f_{MAX}	Maximum Clock Pulse Frequency	2	6		5		4		MHz
		4.5	30		24		20		
		6	35		28		24		
HCT TYPES									
t_{WL}, t_{WH}	CLK Pulse Width	4.5	18		23		27		ns
t_{WL}	SH/$\overline{LD}$ Pulse Width	4.5	20		25		30		ns
t_{SU}	Set-up Time SER to CLK	4.5	20		25		30		ns
$t_{SU(L)}$	CLK INH to CLK	4.5	20		25		30		ns
t_{SU}	A-H to SH/$\overline{LD}$	6	20		25		30		ns
t_H	Hold Time SER to CLK or CLK INH	4.5	7		9		11		ns
t_S, t_H	CLK INH to CLK	4.5	0		0		0		ns
t_{REC}	Recovery Time SH/$\overline{LD}$ to CLK	4.5	20		25		30		ns
f_{MAX}	Maximum Clock Pulse Frequency	4.5	27		22		18		MHz

5.6 Switching Characteristics

Input t_r, t_f = 6 ns. Unless otherwise specified, C_L = 50pF

PARAMETER		V_{CC}(V)	25℃		-40℃ to 85℃	-55℃ to 125℃	UNIT
			TYP	MAX	MAX	MAX	
HC TYPES							
t_{pd}	CLK or CLK INH to Q_H or $\overline{Q}_H$	2		165	205	250	ns
		4.5	13(3)	33	41	50	ns
		6		28	35	43	ns
	SH/$\overline{LD}$ to Q_H or $\overline{Q}_H$	2		175	220	265	ns
		4.5	14(3)	35	44	53	ns
		6		30	37	45	ns
	H to Q_H or $\overline{Q}_H$	2		150	190	225	ns
		4.5	12(3)	30	38	45	ns
		6		26	33	38	ns
t_t	Output Transition Times	2		75	95	110	ns
		4.5		15	19	22	ns
		6		13	16	19	ns
C_{IN}	Input Capacitance			10	10	10	pF
C_{PD}	Power Dissipation Capacitance(1) (2)	5	17				pF
HCT TYPES							
t_{pd}	CLK or CLK INH to Q_H or $\overline{Q}_H$	4.5	17(3)	40	50	60	ns
	SH/$\overline{LD}$ to Q_H or $\overline{Q}_H$	4.5	17(3)	40	50	60	ns
	H to Q_H or $\overline{Q}_H$	4.5	14(3)	35	44	53	ns
t_t	Output Transition Times	4.5		15	19	22	ns
C_{IN}	Input Capacitance			10	10	10	pF
C_{PD}	Power Dissipation Capacitance(1) (2)	5	24				pF

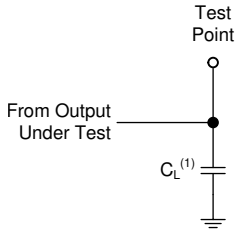
(1) C_{PD} is used to determine the dynamic power consumption, per package.
(2) $P_D = V_{CC}^2 f_i + \Sigma (C_L V_{CC}^2 + f_O)$ where f_i = Input Frequency, f_O = Output Frequency, C_L = Output Load Capacitance, V_{CC} = Supply Voltage.
(3) C_L = 15 pF and V_{CC} = 5 V.

6 Parameter Measurement Information

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_t < 6 ns.

For clock inputs, f_{max} is measured when the input duty cycle is 50%.

The outputs are measured one at a time with one input transition per measurement.



(1) C_L includes probe and test-fixture capacitance.

图 6-1. Load Circuit for Push-Pull Outputs

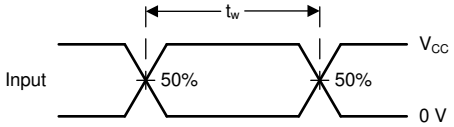


图 6-2. Voltage Waveforms, Standard CMOS Inputs Pulse Duration

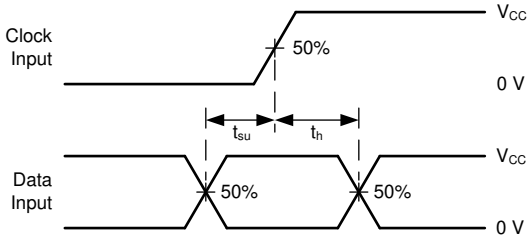
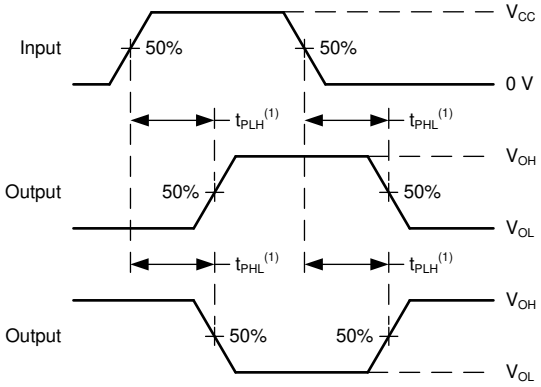
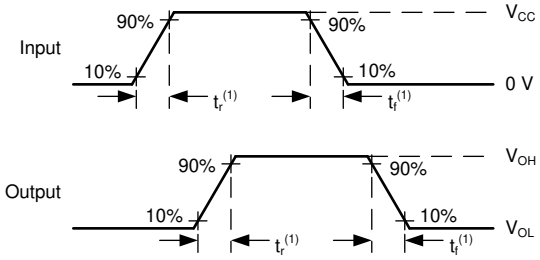


图 6-3. Voltage Waveforms, Standard CMOS Inputs Setup and Hold Times



(1) The greater between t_{PLH} and t_{PHL} is the same as t_{pd}.

图 6-4. Voltage Waveforms, Standard CMOS Inputs Setup Propagation Delays



(1) The greater between t_r and t_f is the same as t_t.

图 6-5. Voltage Waveforms, Input and Output Transition Times for Standard CMOS Input Devices

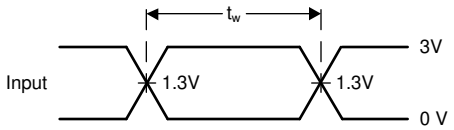


图 6-6. Voltage Waveforms, TTL-Compatible CMOS Inputs Pulse Duration

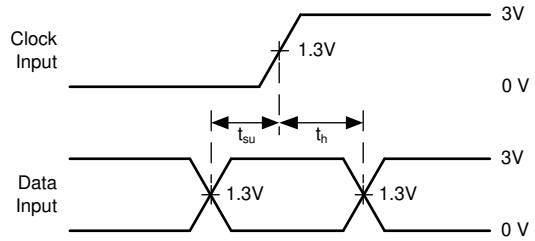
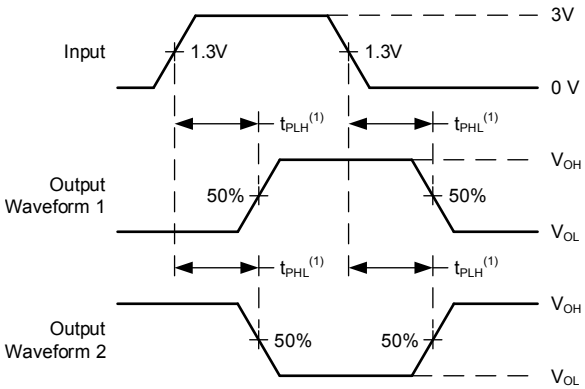


图 6-7. Voltage Waveforms, TTL-Compatible CMOS Inputs Setup and Hold Times



(1) The greater between t_{PLH} and t_{PHL} is the same as t_{pd}.

图 6-8. Voltage Waveforms, TTL-Compatible CMOS Inputs Propagation Delays

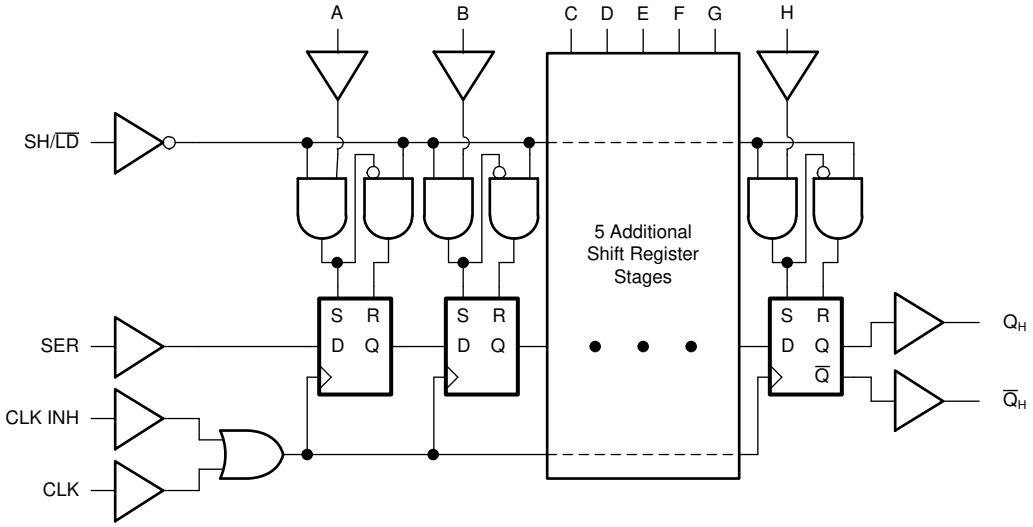
7 Detailed Description

7.1 Overview

The ’HC165 and ’HCT165 are 8-bit parallel or serial-in shift registers with complementary serial outputs (Q_H and $\overline{Q}_H$) available from the last stage. When the parallel load (SH/$\overline{LD}$) input is LOW, parallel data from the A to H inputs are loaded into the register asynchronously. When the SH/$\overline{LD}$ is HIGH, data enters the register serially at the SER input and shifts one place to the right (A→B→C, etc.) with each positive-going clock transition. This feature allows parallel-to-serial converter expansion by connecting the Q_H output to the SER input of the succeeding device.

For predictable operation the LOW-to-HIGH transition of CLK INH should only take place while CLK is HIGH. Also, CLK and CLK INH should be LOW before the LOW-to-HIGH transition of SH/$\overline{LD}$ to prevent shifting the data when SH/$\overline{LD}$ goes HIGH.

7.2 Functional Block Diagram



7.3 Device Functional Modes

表 7-1. Truth Table(1)

OPERATING MODE	INPUTS					QnREGISTER		OUTPUTS	
	SH$\overline{LD}$	CLK INH	CLK	SER	A - H	Q_A	Q_B - Q_G	Q_H	$\overline{Q}_H$
Parallel Load	L	X	X	X	L	L	L-L	L	H
	L	X	X	X	H	H	H-H	H	L
Serial Shift	H	L	↑	l	X	L	q_A - q_F	q_G	$\overline{q}_G$
	H	L	↑	h	X	H	q_A - q_F	q_G	$\overline{q}_G$
Hold (Do Nothing)	H	H	X	X	X	q_A	q_B - q_G	q_H	$\overline{q}_H$

(1) H = High voltage level.
h = High voltage level one set-up time prior to the low-to-high clock transition.
l = Low voltage level one set-up time prior to the low-to-high clock transition.
L = Low voltage level.
X = Don’t care.
↑ = Transition from low to high level.
q_n = Lower case letters indicate the state of the reference output clock transition.

8 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 0.1-μF capacitor is recommended for this device. It is acceptable to parallel multiple bypass caps to reject different frequencies of noise. The 0.1-μF and 1-μF capacitors are commonly used in parallel. The bypass capacitor should be installed as close to the power terminal as possible for best results.

9 Layout

9.1 Layout Guidelines

When using multiple-input and multiple-channel logic devices inputs must not ever be left floating. 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 unused input pins must not be left unconnected because the undefined voltages at the outside connections result in undefined operational states. All unused inputs of digital logic devices must be connected to a logic high or logic low voltage, as defined by the input voltage specifications, to prevent them from floating. The logic level that must be applied to any particular unused input depends on the function of the device. Generally, the inputs are tied to GND or V_{CC}, whichever makes more sense for the logic function or is more convenient.

10 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.

10.1 接收文档更新通知

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

10.2 支持资源

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

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10.3 Trademarks

TI E2E™ is a trademark of Texas Instruments.
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10.4 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.

10.5 术语表

TI 术语表　　本术语表列出并解释了术语、首字母缩略词和定义。

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.

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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
5962-8685501EA	ACTIVE	CDIP	J	16	1	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	5962-8685501EA CD54HCT165F3A	Samples
CD54HC165F3A	ACTIVE	CDIP	J	16	1	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	8409501EA CD54HC165F3A	Samples
CD54HCT165F3A	ACTIVE	CDIP	J	16	1	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	5962-8685501EA CD54HCT165F3A	Samples
CD74HC165E	ACTIVE	PDIP	N	16	25	RoHS & Green	NIPDAU	N / A for Pkg Type	-55 to 125	CD74HC165E	Samples
CD74HC165EE4	ACTIVE	PDIP	N	16	25	RoHS & Green	NIPDAU	N / A for Pkg Type	-55 to 125	CD74HC165E	Samples
CD74HC165M	ACTIVE	SOIC	D	16	40	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-55 to 125	HC165M	Samples
CD74HC165M96	ACTIVE	SOIC	D	16	2500	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-55 to 125	HC165M	Samples
CD74HC165M96G4	ACTIVE	SOIC	D	16	2500	TBD	Call TI	Call TI	-55 to 125		Samples
CD74HC165ME4	ACTIVE	SOIC	D	16	40	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-55 to 125	HC165M	Samples
CD74HC165MT	ACTIVE	SOIC	D	16	250	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-55 to 125	HC165M	Samples
CD74HC165MTE4	ACTIVE	SOIC	D	16	250	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-55 to 125	HC165M	Samples
CD74HCT165E	ACTIVE	PDIP	N	16	25	RoHS & Green	NIPDAU	N / A for Pkg Type	-55 to 125	CD74HCT165E	Samples
CD74HCT165EE4	ACTIVE	PDIP	N	16	25	RoHS & Green	NIPDAU	N / A for Pkg Type	-55 to 125	CD74HCT165E	Samples
CD74HCT165M	ACTIVE	SOIC	D	16	40	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-55 to 125	HCT165M	Samples
CD74HCT165M96	ACTIVE	SOIC	D	16	2500	RoHS & Green	NIPDAU | SN	Level-1-260C-UNLIM	-55 to 125	HCT165M	Samples
CD74HCT165M96E4	ACTIVE	SOIC	D	16	2500	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-55 to 125	HCT165M	Samples
CD74HCT165M96G4	ACTIVE	SOIC	D	16	2500	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-55 to 125	HCT165M	Samples
CD74HCT165ME4	ACTIVE	SOIC	D	16	40	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-55 to 125	HCT165M	Samples
CD74HCT165MT	ACTIVE	SOIC	D	16	250	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-55 to 125	HCT165M	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 CD54HC165, CD54HCT165, CD74HC165, CD74HCT165 :

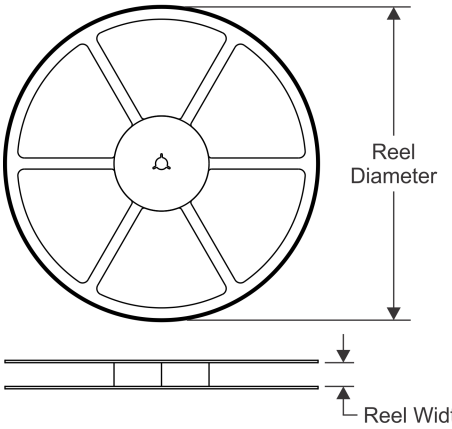
- Catalog : CD74HC165, CD74HCT165
- Military : CD54HC165, CD54HCT165

NOTE: Qualified Version Definitions:

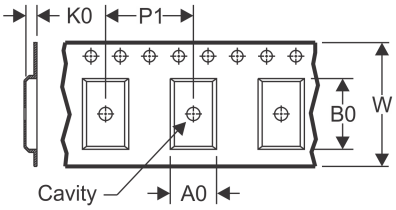
- Catalog - TI's standard catalog product
- Military - QML certified for Military and Defense Applications

TAPE AND REEL INFORMATION

REEL DIMENSIONS

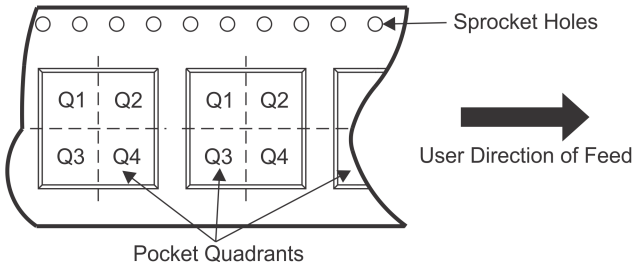


TAPE DIMENSIONS



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

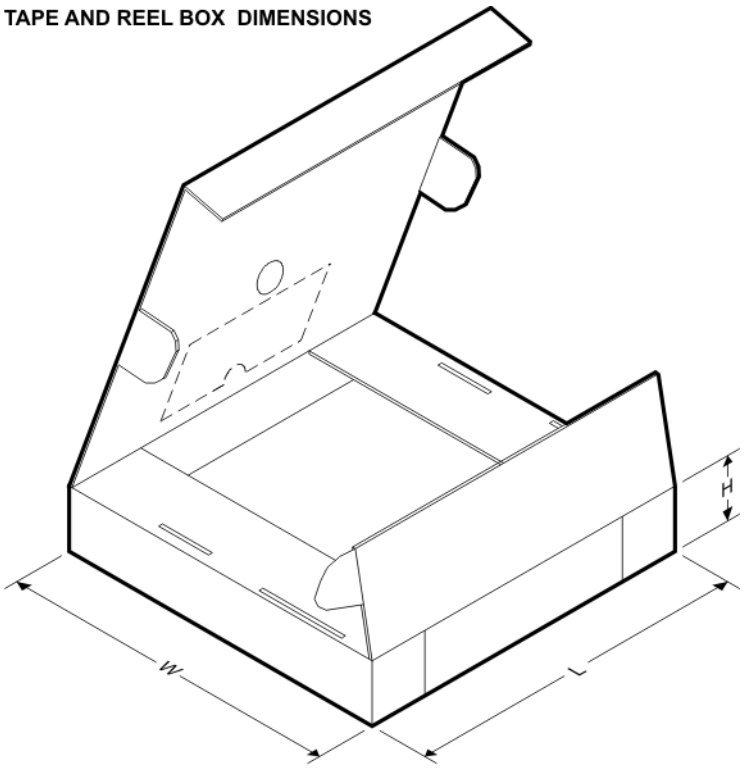
QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*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
CD74HC165M96	SOIC	D	16	2500	330.0	16.4	6.5	10.3	2.1	8.0	16.0	Q1
CD74HC165M96	SOIC	D	16	2500	330.0	16.4	6.5	10.3	2.1	8.0	16.0	Q1
CD74HCT165M96	SOIC	D	16	2500	330.0	16.4	6.5	10.3	2.1	8.0	16.0	Q1
CD74HCT165M96	SOIC	D	16	2500	330.0	16.8	6.5	10.3	2.1	8.0	16.0	Q1
CD74HCT165M96G4	SOIC	D	16	2500	330.0	16.4	6.5	10.3	2.1	8.0	16.0	Q1

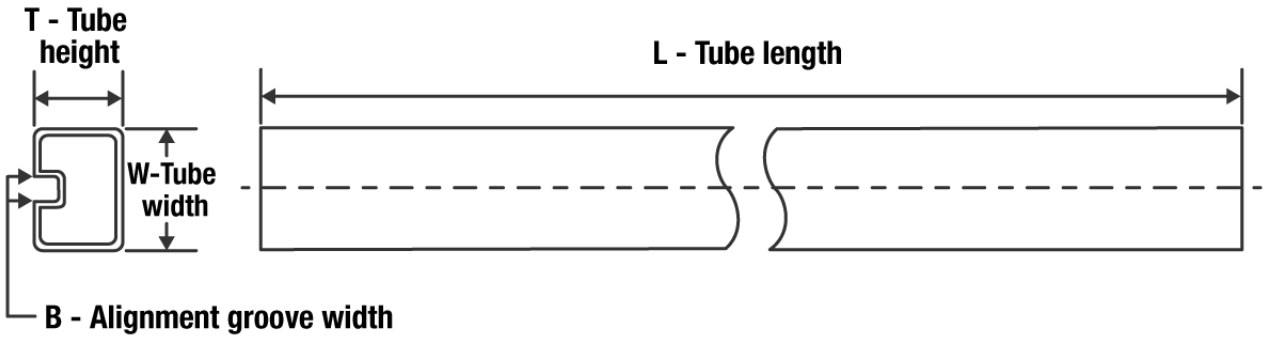
TAPE AND REEL BOX DIMENSIONS



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
CD74HC165M96	SOIC	D	16	2500	853.0	449.0	35.0
CD74HC165M96	SOIC	D	16	2500	340.5	336.1	32.0
CD74HCT165M96	SOIC	D	16	2500	340.5	336.1	32.0
CD74HCT165M96	SOIC	D	16	2500	364.0	364.0	27.0
CD74HCT165M96G4	SOIC	D	16	2500	340.5	336.1	32.0

TUBE



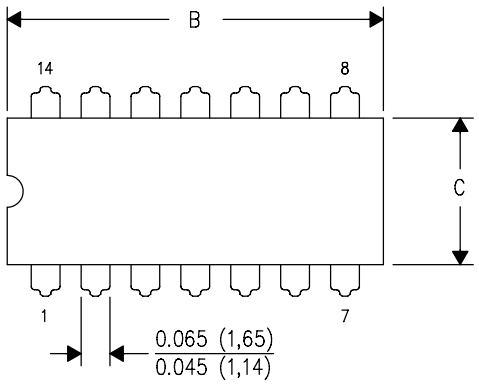
*All dimensions are nominal

Device	Package Name	Package Type	Pins	SPQ	L (mm)	W (mm)	T (µm)	B (mm)
CD74HC165E	N	PDIP	16	25	506	13.97	11230	4.32
CD74HC165E	N	PDIP	16	25	506	13.97	11230	4.32
CD74HC165EE4	N	PDIP	16	25	506	13.97	11230	4.32
CD74HC165EE4	N	PDIP	16	25	506	13.97	11230	4.32
CD74HC165M	D	SOIC	16	40	506.6	8	3940	4.32
CD74HC165M	D	SOIC	16	40	507	8	3940	4.32
CD74HC165ME4	D	SOIC	16	40	506.6	8	3940	4.32
CD74HC165ME4	D	SOIC	16	40	507	8	3940	4.32
CD74HCT165E	N	PDIP	16	25	506	13.97	11230	4.32
CD74HCT165E	N	PDIP	16	25	506	13.97	11230	4.32
CD74HCT165EE4	N	PDIP	16	25	506	13.97	11230	4.32
CD74HCT165EE4	N	PDIP	16	25	506	13.97	11230	4.32
CD74HCT165M	D	SOIC	16	40	507	8	3940	4.32
CD74HCT165ME4	D	SOIC	16	40	507	8	3940	4.32

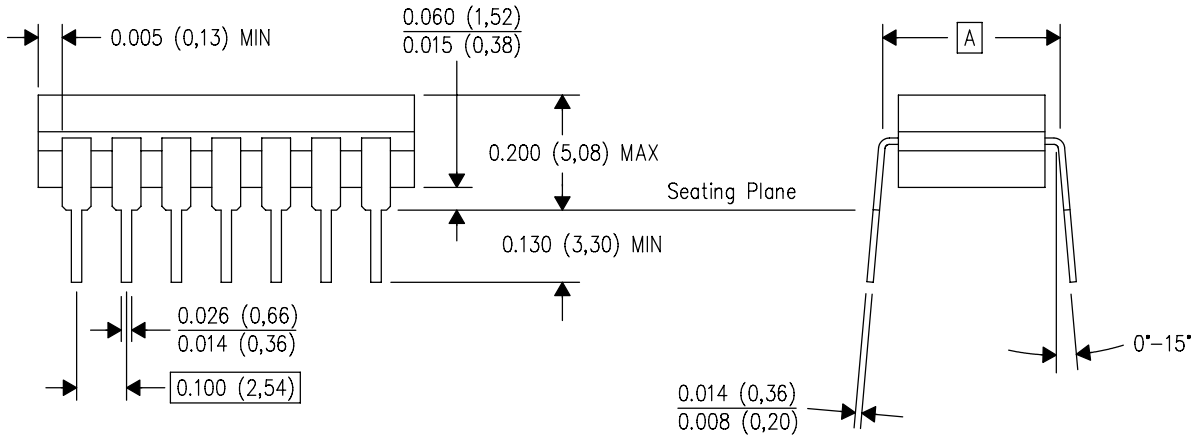
J (R–GDIP–T**)

14 LEADS SHOWN

CERAMIC DUAL IN–LINE PACKAGE



DIM \ PINS **	14	16	18	20
A	0.300 (7,62) BSC	0.300 (7,62) BSC	0.300 (7,62) BSC	0.300 (7,62) BSC
B MAX	0.785 (19,94)	.840 (21,34)	0.960 (24,38)	1.060 (26,92)
B MIN	—	—	—	—
C MAX	0.300 (7,62)	0.300 (7,62)	0.310 (7,87)	0.300 (7,62)
C MIN	0.245 (6,22)	0.245 (6,22)	0.220 (5,59)	0.245 (6,22)



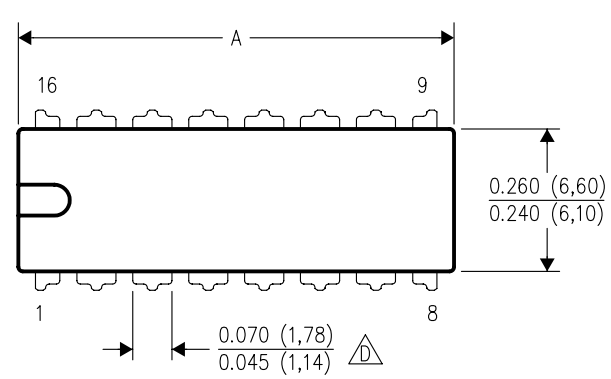
4040083/F 03/03

NOTES:
A. All linear dimensions are in inches (millimeters).
B. This drawing is subject to change without notice.
C. This package is hermetically sealed with a ceramic lid using glass frit.
D. Index point is provided on cap for terminal identification only on press ceramic glass frit seal only.
E. Falls within MIL STD 1835 GDIP1–T14, GDIP1–T16, GDIP1–T18 and GDIP1–T20.

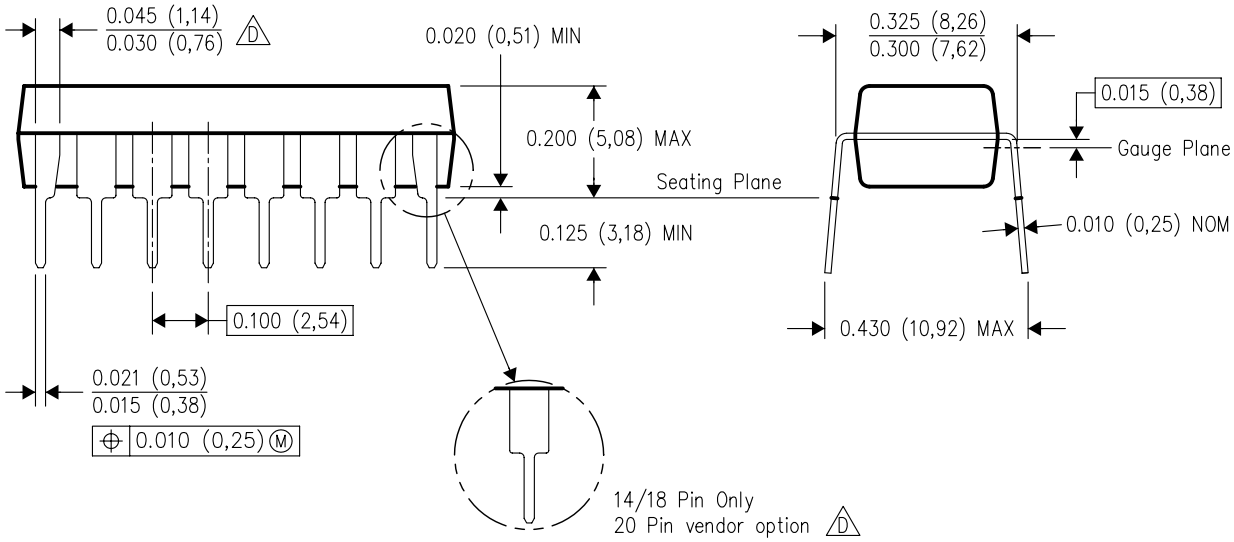
N (R–PDIP–T**)

PLASTIC DUAL–IN–LINE PACKAGE

16 PINS SHOWN



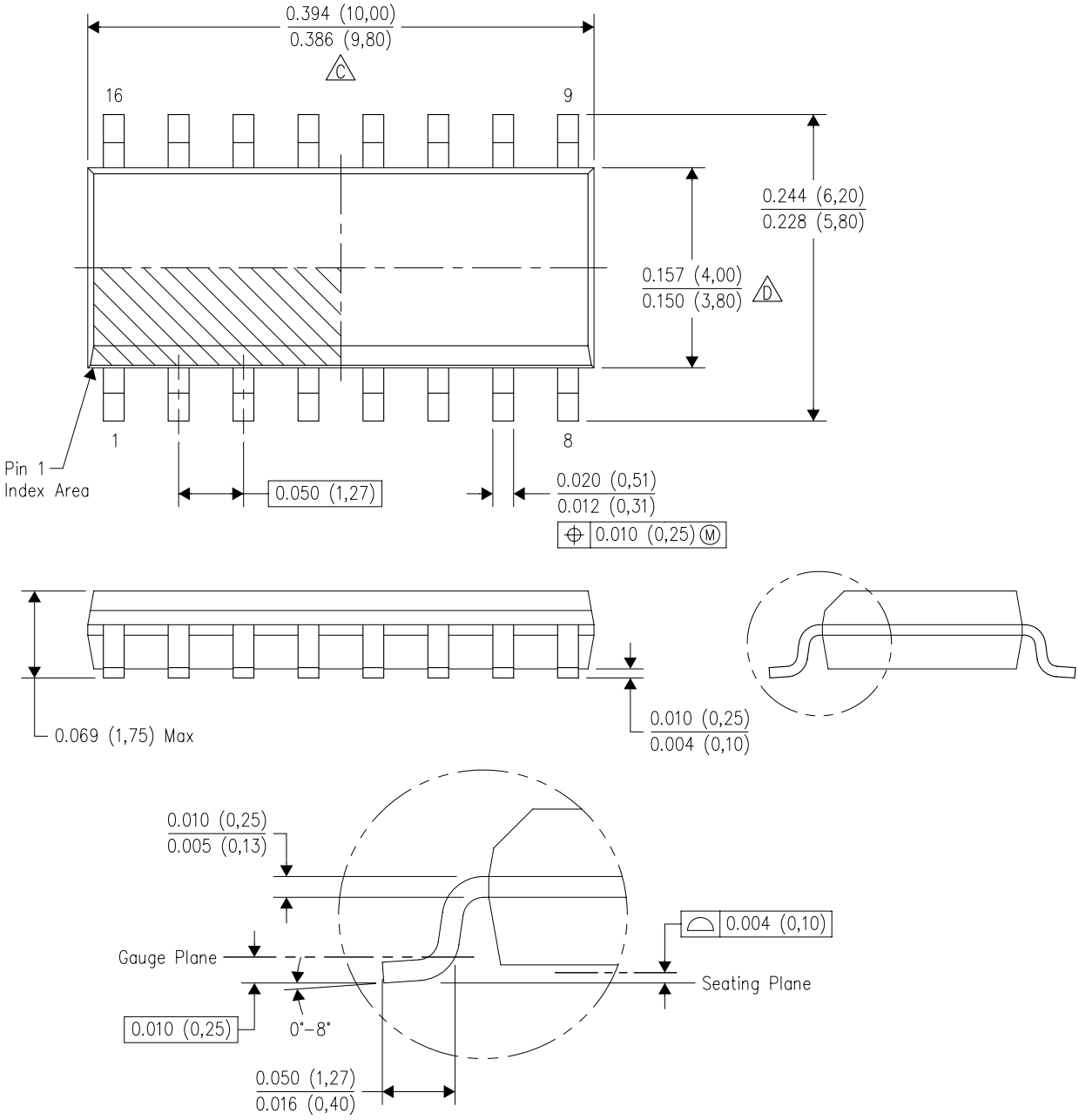
DIM \ PINS **	14	16	18	20
A MAX	0.775 (19,69)	0.775 (19,69)	0.920 (23,37)	1.060 (26,92)
A MIN	0.745 (18,92)	0.745 (18,92)	0.850 (21,59)	0.940 (23,88)
MS–001 VARIATION (C)	AA	BB	AC	AD



4040049/E 12/2002

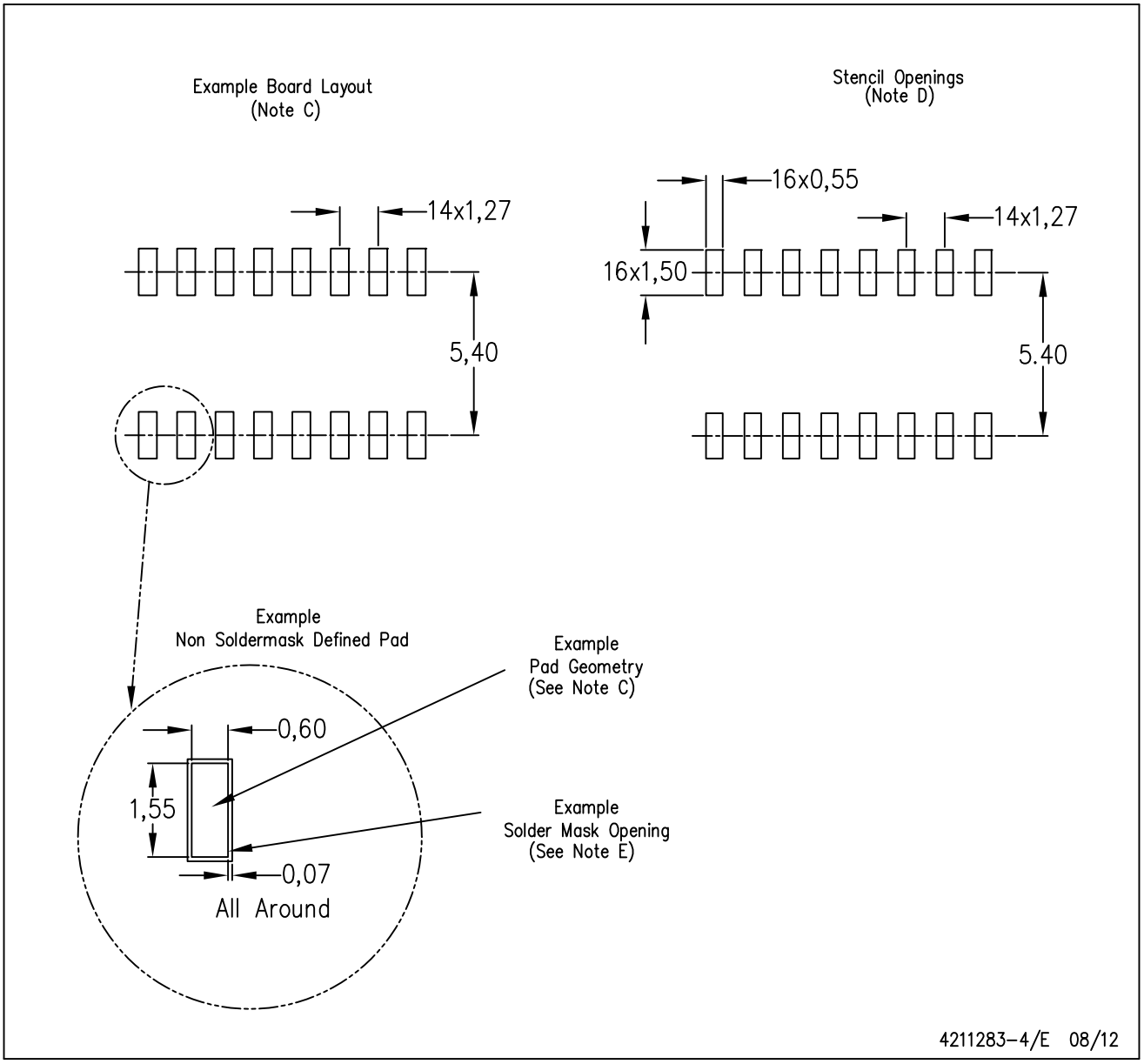
NOTES:
A. All linear dimensions are in inches (millimeters).
B. This drawing is subject to change without notice.
C. Falls within JEDEC MS–001, except 18 and 20 pin minimum body length (Dim A).
D. The 20 pin end lead shoulder width is a vendor option, either half or full width.

D (R–PDSO–G16) PLASTIC SMALL OUTLINE



NOTES:
A. All linear dimensions are in inches (millimeters).
B. This drawing is subject to change without notice.
C. Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.006 (0,15) each side.
D. Body width does not include interlead flash. Interlead flash shall not exceed 0.017 (0,43) each side.
E. Reference JEDEC MS–012 variation AC.

D (R–PDSO–G16) PLASTIC SMALL OUTLINE



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. 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 other stencil recommendations.
E. Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.

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