

## CDx4HC173、CDx4HCT173 三态高速 CMOS 逻辑四路 D 型触发器

### 1 特性

- 三态缓冲输出
- 门控输入和输出使能
- 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:  $-55^{\circ}\text{C}$  至  $125^{\circ}\text{C}$
- 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
  - 工作电压为 2V 至 6V
  - 高抗噪性: 当  $V_{\text{CC}} = 5\text{V}$  时,  $N_{\text{IL}} = 30\%$ ,  $N_{\text{IH}} = V_{\text{CC}}$  的 30%
- HCT 类型
  - 4.5V 至 5.5V 工作电压
  - 直接 LSTTL 输入逻辑兼容性,  $V_{\text{IL}} = 0.8\text{V}$  (最大值),  $V_{\text{IH}} = 2\text{V}$  (最小值)
  - CMOS 输入兼容性, 当电压为  $V_{\text{OL}}$ 、 $V_{\text{OH}}$  时,  $I_{\text{I}} \leq 1\mu\text{A}$

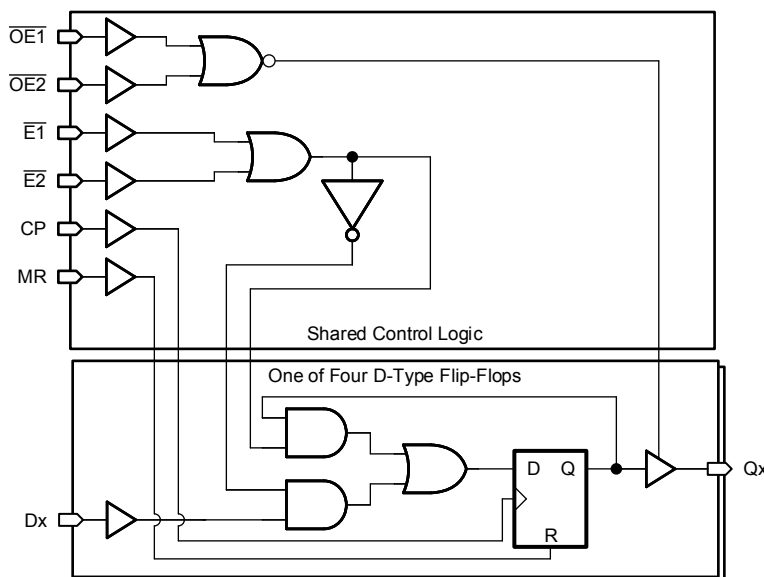
### 2 说明

CDx4HC173 和 CDx4HCT173 包含四个独立的 D 型触发器, 带有共享时钟 (CP)、复位 (MR) 和数据使能 (E1, E2) 引脚。

器件信息

器件型号	封装 <sup>(1)</sup>	封装尺寸 (标称值)
CD54HC173F	CDIP (16)	21.34mm × 6.92mm
CD54HCT173F3A	CDIP (16)	21.34mm × 6.92mm
CD74HC173E	PDIP (16)	19.31mm × 6.35mm
CD74HCT173E	PDIP (16)	19.31mm × 6.35mm
CD74HC173M	SOIC (16)	9.90mm × 3.90mm
CD74HCT173M	SOIC (16)	9.90mm × 3.90mm
CD74HC173PW	TSSOP (16)	5.00mm × 4.40mm

(1) 如需了解所有封装, 请参阅数据表末尾的可订购产品附录。



功能方框图



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## 3 Revision History

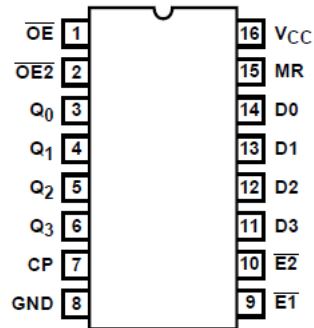
注：以前版本的页码可能与当前版本的页码不同

### Changes from Revision E (October 2003) to Revision F (March 2022)

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

## 4 Pin Configuration and Functions



J, N, D, or PW Package  
16-Pin CDIP, PDIP, SOIC, or TSSOP  
Top View

## 5 Specifications

### 5.1 Absolute Maximum Ratings

Over operating free-air temperature range (unless otherwise noted)<sup>(1)</sup>

		MIN	MAX	UNIT
V <sub>CC</sub>	Supply voltage	- 0.5	7	V
I <sub>IK</sub>	Input diode current <sup>(2)</sup>	V <sub>I</sub> < - 0.5 V or V <sub>I</sub> > V <sub>CC</sub> + 0.5 V		±20 mA
I <sub>OK</sub>	Output diode current <sup>(2)</sup>	V <sub>O</sub> < - 0.5 V or V <sub>O</sub> > V <sub>CC</sub> + 0.5 V		±20 mA
I <sub>O</sub>	Output source or sink current per output pin	V <sub>O</sub> > - 0.5 V or V <sub>O</sub> < V <sub>CC</sub> + 0.5 V		±25 mA
	Continuous current through V <sub>CC</sub> or GND		±70	mA
T <sub>J</sub>	Junction temperature		150	°C
	Lead temperature (soldering 10s) (SOIC - lead tips only)		300	°C
T <sub>stg</sub>	Storage temperature	- 65	150	°C

- (1) Stresses beyond those listed under *Absolute Maximum Rating* may cause permanent damage to the device. These are stress ratings only, which do not imply functional operation of the device at these or any other conditions beyond those indicated under *Recommended Operating Condition*. 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.

### 5.2 Recommended Operating Conditions

		MIN	MAX	UNIT	
V <sub>CC</sub>	Supply voltage range	HC types	2	6	V
		HCT types	4.5	5.5	
V <sub>I</sub>	Input voltage	0	V <sub>CC</sub>	V	
V <sub>O</sub>	Output voltage	0	V <sub>CC</sub>	V	
t <sub>t</sub>	Input rise and fall time	V <sub>CC</sub> = 2V		1000	ns
		V <sub>CC</sub> = 4.5V		500	
		V <sub>CC</sub> = 6V		400	
T <sub>A</sub>	Temperature range	-55	125	°C	

### 5.3 Thermal Information

THERMAL METRIC		N (PDIP)	D (SOIC)	NS (SOP)	PW (TSSOP)	UNIT
		16 PINS	16 PINS	16 PINS	16 PINS	
R <sub>θJA</sub>	Junction-to-ambient thermal resistance <sup>(1)</sup>	67	73	64	108	°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 <sup>(1)</sup>	V <sub>CC</sub>	25°C			-40°C to 85°C		-55°C to 125°C		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
<b>HC TYPES</b>											
V <sub>IH</sub>	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 <sub>IL</sub>	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 <sub>OH</sub>	High-level output voltage CMOS loads	I <sub>OH</sub> = -20 μA	2	1.9		1.9		1.9		V	
		I <sub>OH</sub> = -20 μA	4.5	4.4		4.4		4.4		V	
		I <sub>OH</sub> = -20 μA	6	5.9		5.9		5.9		V	
	High-level output voltage TTL loads	I <sub>OH</sub> = -6mA	4.5	3.98		3.84		3.7		V	
		I <sub>OH</sub> = -7.8mA	6	5.48		5.34		5.2		V	
V <sub>OL</sub>	Low-level output voltage CMOS loads	I <sub>OL</sub> = 20 μA	2	0.1		0.1		0.1		V	
		I <sub>OL</sub> = 20 μA	4.5	0.1		0.1		0.1		V	
		I <sub>OL</sub> = 20 μA	6	0.1		0.1		0.1		V	
	Low-level output voltage TTL loads	I <sub>OL</sub> = 6mA	4.5	0.26		0.33		0.4		V	
		I <sub>OL</sub> = 7.8mA	6	0.26		0.33		0.4		V	
I <sub>I</sub>	Input leakage current	V <sub>CC</sub> or GND	6	±0.1		±1		±1		μA	
I <sub>CC</sub>	Supply current	V <sub>CC</sub> or GND	6	8		80		160		μA	
I <sub>OZ</sub>	Three-state leakage current		6	±0.5		±0.5		±10		μA	
<b>HCT TYPES</b>											
V <sub>IH</sub>	High-level input voltage		4.5 to 5.5	2		2		2		V	
V <sub>IL</sub>	Low-level input voltage		4.5 to 5.5	0.8		0.8		0.8		V	
V <sub>OH</sub>	High-level output voltage CMOS loads	I <sub>OH</sub> = -20 μA	4.5	4.4		4.4		4.4		V	
	High-level output voltage TTL loads	I <sub>OH</sub> = -6mA	4.5	3.98		3.84		3.7		V	
V <sub>OL</sub>	Low-level output voltage CMOS loads	I <sub>OL</sub> = 20 μA	4.5	0.1		0.1		0.1		V	
	Low-level output voltage TTL loads	I <sub>OL</sub> = 6mA	4.5	0.26		0.33		0.4		V	
I <sub>I</sub>	Input leakage current	V <sub>CC</sub> and GND	5.5	±0.1		±1		±1		μA	
I <sub>CC</sub>	Supply Current	V <sub>CC</sub> and GND	5.5	8		80		160		μA	
ΔI <sub>CC</sub> <sup>(2) (3)</sup>	Additional supply current per input pin	One of D0-D3	4.5 to 5.5	15 54		67.5		73.5		μA	
		One of $\overline{E1}$ and $\overline{E2}$	4.5 to 5.5	15 54		67.5		73.5		μA	
		CP	4.5 to 5.5	25 90		112.5		122.5		μA	
		MR	4.5 to 5.5	20 72		90		98		μA	
		One of $\overline{OE1}$ and $\overline{OE2}$	4.5 to 5.5	50 180		225		245		μA	

PARAMETER		TEST CONDITIONS <sup>(1)</sup>	V <sub>CC</sub>	25°C			-40°C to 85°C		-55°C to 125°C		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
I <sub>OZ</sub>	Three-state leakage current		5.5			±0.5		±5.0		±10	µA

(1) V<sub>I</sub> = V<sub>IH</sub> or V<sub>IL</sub>, unless otherwise noted.

(2) For dual-supply systems theoretical worst case (V<sub>I</sub> = 2.4 V, V<sub>CC</sub> = 5.5 V) specification is 1.8 mA.

(3) Inputs held at V<sub>CC</sub> - 2.1.

## 5.5 Switching Characteristics

Input t<sub>t</sub> = 6ns. Unless otherwise specified, C<sub>L</sub> = 50pF

PARAMETER		V <sub>CC</sub> (V)	25°C		-40°C to 85°C	-55°C to 125°C	UNIT
			TYP	MAX	MAX	MAX	
<b>HC TYPES</b>							
t <sub>pd</sub>	Propagation delay, clock to output	2		200	250	300	ns
		4.5	17 <sup>(1)</sup>	40	50	60	
		6		34	43	51	
t <sub>pd</sub>	Propagation delay, MR to output	2		175	220	265	ns
		4.5	12 <sup>(1)</sup>	35	44	53	
		6		30	37	45	
t <sub>pd</sub>	Propagation delay output enable to Q (Figure 6)	2		150	190	225	ns
		4.5	12 <sup>(1)</sup>	30	38	45	
		6		26	33	38	
t <sub>t</sub>	Output transition times	2		60	75	90	ns
		4.5		12	15	18	
		6		10	13	15	
f <sub>MAX</sub>	Maximum clock frequency	5	60 <sup>(1)</sup>				MHz
C <sub>i</sub>	Input capacitance			10	10	10	pF
C <sub>O</sub>	Three-state output capacitance			10	10	10	pF
C <sub>pd</sub> <sup>(2) (3)</sup>	Power dissipation capacitance	5	29				pF
<b>HCT TYPES</b>							
t <sub>pd</sub>	Propagation delay, clock to output	4.5	17 <sup>(1)</sup>	40	50	60	ns
t <sub>pd</sub>	Propagation delay, MR to output	4.5	18 <sup>(1)</sup>	44	55	66	ns
t <sub>pd</sub>	Propagation delay output enable to Q (Figure 6)	2		150	190	225	ns
		4.5	14 <sup>(1)</sup>	30	38	45	
		6		26	33	38	
t <sub>t</sub>	Output transition times	4.5		15	19	22	ns
f <sub>MAX</sub>	Maximum clock frequency	5	60 <sup>(1)</sup>				MHz
C <sub>i</sub>	Input capacitance			10	10	10	pF
C <sub>pd</sub> <sup>(2) (3)</sup>	Power dissipation capacitance	5	34				pF

(1) Typical value tested at 5V, C<sub>L</sub> = 15pF.

(2) C<sub>PD</sub> is used to determine the dynamic power consumption, per package.

(3) P<sub>D</sub> = V<sub>CC</sub><sup>2</sup>f<sub>i</sub> + ∑ (C<sub>L</sub> V<sub>CC</sub><sup>2</sup> + f<sub>o</sub>) where f<sub>i</sub> = Input Frequency, C<sub>L</sub> = Output Load Capacitance, V<sub>CC</sub> = Supply Voltage.

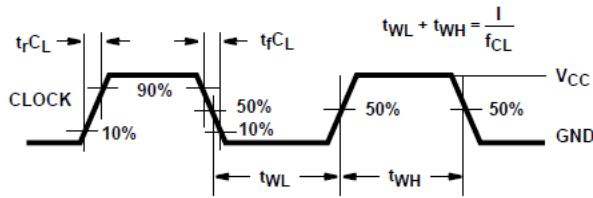
## 5.6 Prerequisite For Switching Characteristics

PARAMETER	V <sub>CC</sub> (V)	25°C		-40°C to 85°C		-55°C to 125°C		UNITS
		MIN	MAX	MIN	MAX	MIN	MAX	
<b>HC TYPES</b>								
f <sub>MAX</sub>	Maximum clock frequency	2	6	5	4	MHz		
		4.5	30	24	20			
		6	35	28	24			
t <sub>W</sub>	MR pulse width	2	80	100	120	ns		
		4.5	16	20	24			
		6	14	17	20			
t <sub>W</sub>	Clock pulse width	2	80	100	120	ns		
		4.5	16	20	24			
		6	14	17	20			
t <sub>SU</sub>	Set-up time, data to clock and $\bar{E}$ to clock	2	60	75	90	ns		
		4.5	12	15	18			
		6	10	13	15			
t <sub>H</sub>	Hold time, data to clock	2	3	3	3	ns		
		4.5	3	3	3			
		6	3	3	3			
t <sub>H</sub>	Hold time, $\bar{E}$ to clock	2	0	0	0	ns		
		4.5	0	0	0			
		6	0	0	0			
t <sub>REM</sub>	Removal time, MR to clock	2	60	75	90	ns		
		4.5	12	15	18			
		6	10	13	15			
<b>HCT TYPES</b>								
f <sub>MAX</sub>	Maximum clock frequency	4.5	20	16	13	MHz		
t <sub>W</sub> t <sub>W</sub>	MR pulse width	4.5	15	19	22	ns		
t <sub>W</sub>	Clock pulse width	4.5	25	31	38	ns		
t <sub>SU</sub>	Set-up Time, $\bar{E}$ to clock	4.5	12	15	18	ns		
t <sub>SU</sub>	Set-up time, data to clock	4.5	18	23	27	ns		
t <sub>H</sub>	Hold time, data to clock	4.5	0	0	0	ns		
t <sub>H</sub>	Hold time, $\bar{E}$ to clock	4.5	0	0	0	ns		
t <sub>REM</sub>	Removal time, MR to clock	4.5	12	15	18	ns		

## 6 Parameter Measurement Information

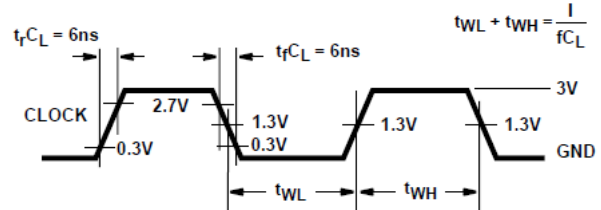
$t_{PD}$  is the maximum between  $t_{PLH}$  and  $t_{PHL}$

$t_t$  is the maximum between  $t_{TLH}$  and  $t_{THL}$



NOTE: Outputs should be switching from 10%  $V_{CC}$  to 90%  $V_{CC}$  in accordance with device truth table. For  $f_{MAX}$ , input duty cycle = 50%

图 6-1. HC clock pulse rise and fall times and pulse width



NOTE: Outputs should be switching from 10%  $V_{CC}$  to 90%  $V_{CC}$  in accordance with device truth table. For  $f_{MAX}$ , input duty cycle = 50%

图 6-2. HCT clock pulse rise and fall times and pulse width

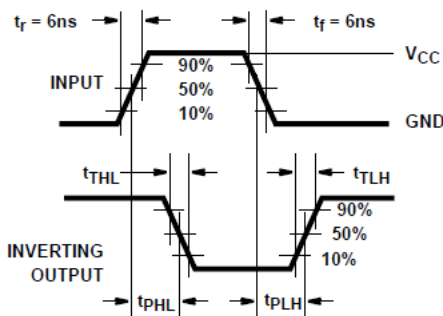


图 6-3. HC and HCU transition times and propagation delay times, combination logic

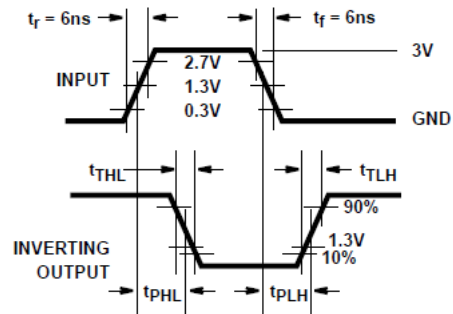


图 6-4. HCT transition times and propagation delay times, combination logic



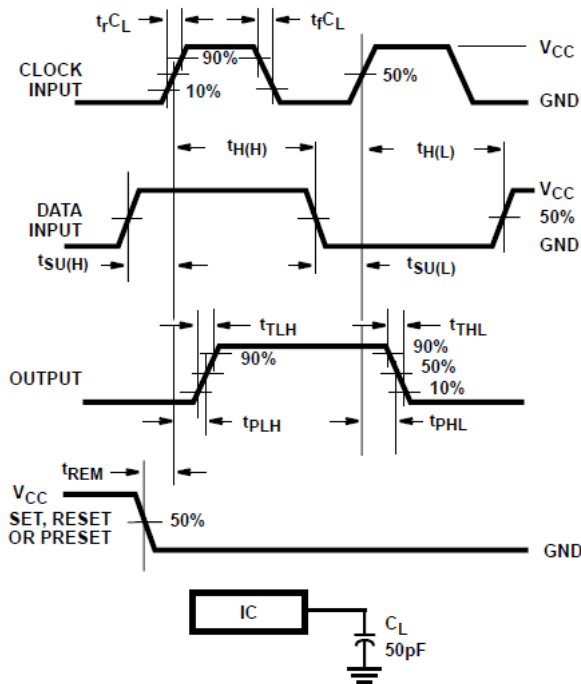


图 6-5. HC setup times, hold times, removal time, and propagation delay times for edge triggered sequential logic circuits

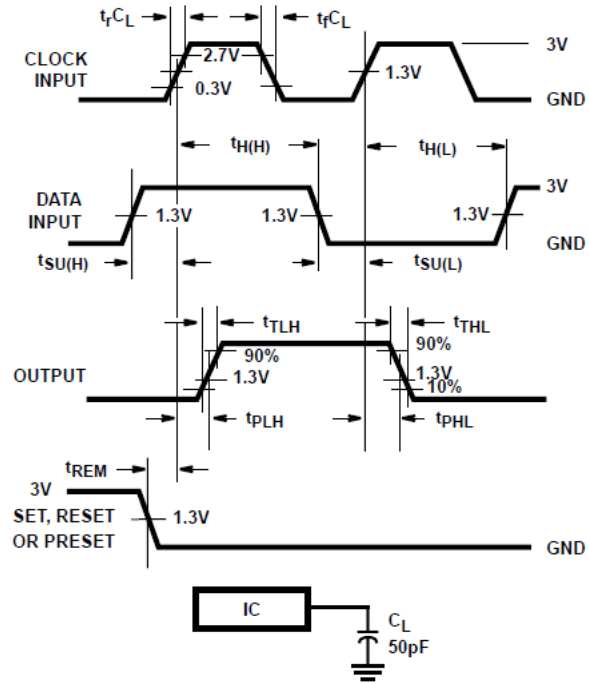


图 6-6. HCT setup times, hold times, removal time, and propagation delay times for edge triggered sequential logic circuits

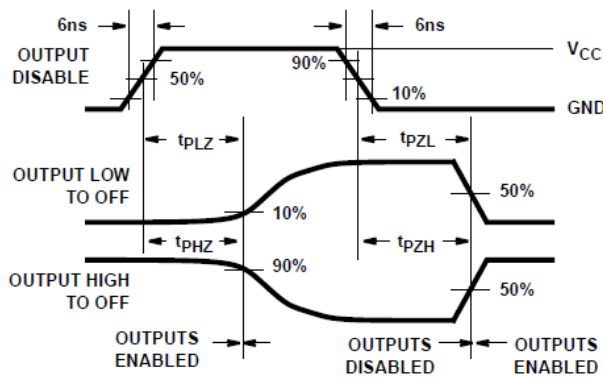


图 6-7. HC three-state propagation delay waveform

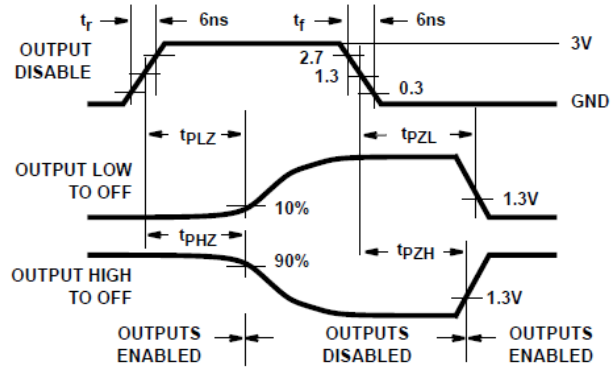
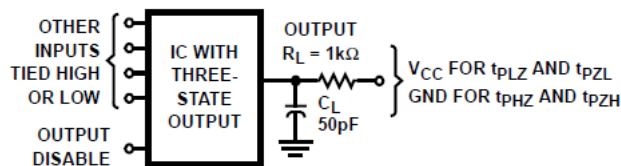


图 6-8. HCT three-state propagation delay waveform



NOTE: Opended drain waveforms  $t_{PLZ}$  and  $t_{PZL}$  are the same as those for three-state shown on the left. The test circuit is Output  $R_L = 1k\Omega$  to  $V_{CC}$ ,  $C_L = 50pF$

图 6-9. HC and HCT three-state propagation delay test circuit

## 7 Detailed Description

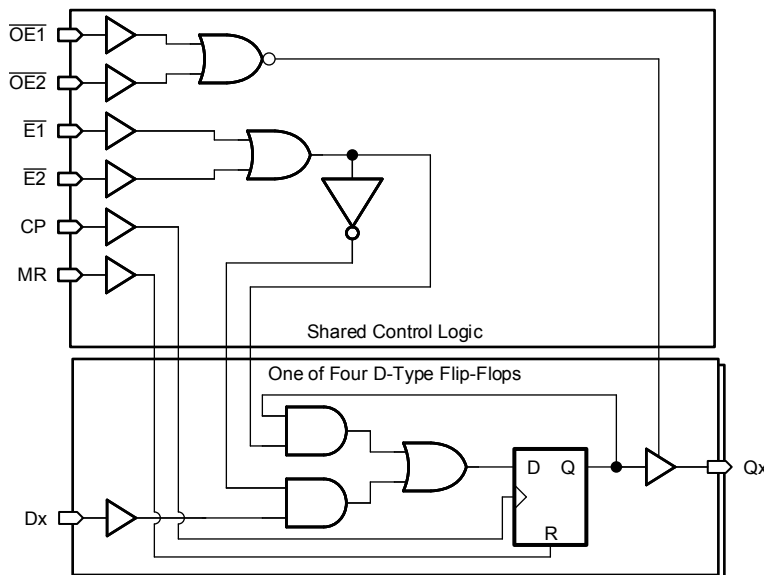
### 7.1 Overview

The CDx4HC173 or CDx4HCT173 high speed three-state quad D-type flip-flops are fabricated with silicon gate CMOS technology. They possess the low power consumption of standard CMOS Integrated circuits, and can operate at speeds comparable to the equivalent low power Schottky devices. The buffered outputs can drive 15 LSTTL loads. The large output drive capability and three-state feature make these parts ideally suited for interfacing with bus lines in bus oriented systems

The four D-type flip-flops operate synchronously from a common clock. The outputs are in the three-state mode when either of the two output disable pins are at the logic “1” level. The input ENABLES allow the flip-flops to remain in their present states without having to disrupt the clock. If either of the 2 input ENABLES are taken to a logic “1” level, the Q outputs are fed back to the inputs, forcing the flip-flops to remain in the same state. Reset is enabled by taking the RESET (MR) input to a logic “1” level. The data outputs change state on the positive going edge of the clock.

The ' HCT173 logic family is functionally, as well as pin compatible with the standard LS logic family.

### 7.2 Functional Block Diagram



### 7.3 Device Functional Modes

表 7-1. Truth Table <sup>(1)(2)</sup>

INPUTS				DATA D	OUTPUT Q <sub>n</sub>
MR	CP	DATA ENABLE			
		E1	E2		
H	X	X	X	X	L
L	L	X	X	X	Q <sub>0</sub>
L	↑	H	X	X	Q <sub>0</sub>
L	↑	X	H	X	Q <sub>0</sub>
L	↑	L	L	L	L
L	↑	L	L	H	H

- (1) H = High voltage level. L = Low voltage level. X = Irrelevant. ↑ = Transition from low to high level. Q<sub>0</sub> = Level before the indicated steady-state input conditions were established.
- (2) When either OE1 or OE2 (or both) is (are) high, the output is disabled to the high-impedance state, however, sequential operation of the flip-flops is not affected.

## 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- $\mu$ F capacitor is recommended for this device. It is acceptable to parallel multiple bypass caps to reject different frequencies of noise. The 0.1- $\mu$ F and 1- $\mu$ F 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 Documentation Support

#### 10.1.1 Related Documentation

### 10.2 接收文档更新通知

要接收文档更新通知，请导航至 [ti.com](http://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。

### 10.3 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。

链接的内容由各个贡献者“按原样”提供。这些内容并不构成 TI 技术规范，并且不一定反映 TI 的观点；请参阅 TI 的 [《使用条款》](#)。

### 10.4 Trademarks

TI E2E™ is a trademark of Texas Instruments.

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### 10.5 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.

### 10.6 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
5962-8682501EA	ACTIVE	CDIP	J	16	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	5962-8682501EA CD54HC173F3A	<a href="#">Samples</a>
5962-8875901EA	ACTIVE	CDIP	J	16	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	5962-8875901EA CD54HCT173F3A	<a href="#">Samples</a>
CD54HC173F	ACTIVE	CDIP	J	16	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	CD54HC173F	<a href="#">Samples</a>
CD54HC173F3A	ACTIVE	CDIP	J	16	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	5962-8682501EA CD54HC173F3A	<a href="#">Samples</a>
CD54HCT173F3A	ACTIVE	CDIP	J	16	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	5962-8875901EA CD54HCT173F3A	<a href="#">Samples</a>
CD74HC173E	ACTIVE	PDIP	N	16	25	RoHS & Green	NIPDAU	N / A for Pkg Type	-55 to 125	CD74HC173E	<a href="#">Samples</a>
CD74HC173M	OBSOLETE	SOIC	D	16		TBD	Call TI	Call TI	-55 to 125	HC173M	
CD74HC173M96	ACTIVE	SOIC	D	16	2500	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-55 to 125	HC173M	<a href="#">Samples</a>
CD74HC173PW	OBSOLETE	TSSOP	PW	16		TBD	Call TI	Call TI	-55 to 125	HJ173	
CD74HC173PWR	ACTIVE	TSSOP	PW	16	2000	RoHS & Green	NIPDAU   SN	Level-1-260C-UNLIM	-55 to 125	HJ173	<a href="#">Samples</a>
CD74HCT173E	ACTIVE	PDIP	N	16	25	RoHS & Green	NIPDAU	N / A for Pkg Type	-55 to 125	CD74HCT173E	<a href="#">Samples</a>
CD74HCT173M	OBSOLETE	SOIC	D	16		TBD	Call TI	Call TI	-55 to 125	HCT173M	
CD74HCT173M96	ACTIVE	SOIC	D	16	2500	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-55 to 125	HCT173M	<a href="#">Samples</a>

(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  $\leq 1000$ ppm threshold. Antimony trioxide based flame retardants must also meet the  $\leq 1000$ ppm threshold requirement.

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

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

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

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

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**OTHER QUALIFIED VERSIONS OF CD54HC173, CD54HCT173, CD74HC173, CD74HCT173 :**

● Catalog : [CD74HC173](#), [CD74HCT173](#)

● Military : [CD54HC173](#), [CD54HCT173](#)

NOTE: Qualified Version Definitions:

● Catalog - TI's standard catalog product

● Military - QML certified for Military and Defense Applications



**TAPE AND REEL INFORMATION**

**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
CD74HC173M96	SOIC	D	16	2500	330.0	16.4	6.5	10.3	2.1	8.0	16.0	Q1
CD74HC173PWR	TSSOP	PW	16	2000	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1
CD74HC173PWR	TSSOP	PW	16	2000	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1
CD74HC173PWR	TSSOP	PW	16	2000	330.0	12.4	6.85	5.45	1.6	8.0	12.0	Q1
CD74HCT173M96	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)
CD74HC173M96	SOIC	D	16	2500	353.0	353.0	32.0
CD74HC173PWR	TSSOP	PW	16	2000	356.0	356.0	35.0
CD74HC173PWR	TSSOP	PW	16	2000	356.0	356.0	35.0
CD74HC173PWR	TSSOP	PW	16	2000	366.0	364.0	50.0
CD74HCT173M96	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)
CD74HC173E	N	PDIP	16	25	506	13.97	11230	4.32
CD74HC173E	N	PDIP	16	25	506	13.97	11230	4.32
CD74HCT173E	N	PDIP	16	25	506	13.97	11230	4.32
CD74HCT173E	N	PDIP	16	25	506	13.97	11230	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:
- All linear dimensions are in inches (millimeters).
  - This drawing is subject to change without notice.
  - This package is hermetically sealed with a ceramic lid using glass frit.
  - Index point is provided on cap for terminal identification only on press ceramic glass frit seal only.
  - Falls within MIL STD 1835 GDIP1-T14, GDIP1-T16, GDIP1-T18 and GDIP1-T20.

N (R-PDIP-T\*\*)

PLASTIC DUAL-IN-LINE PACKAGE

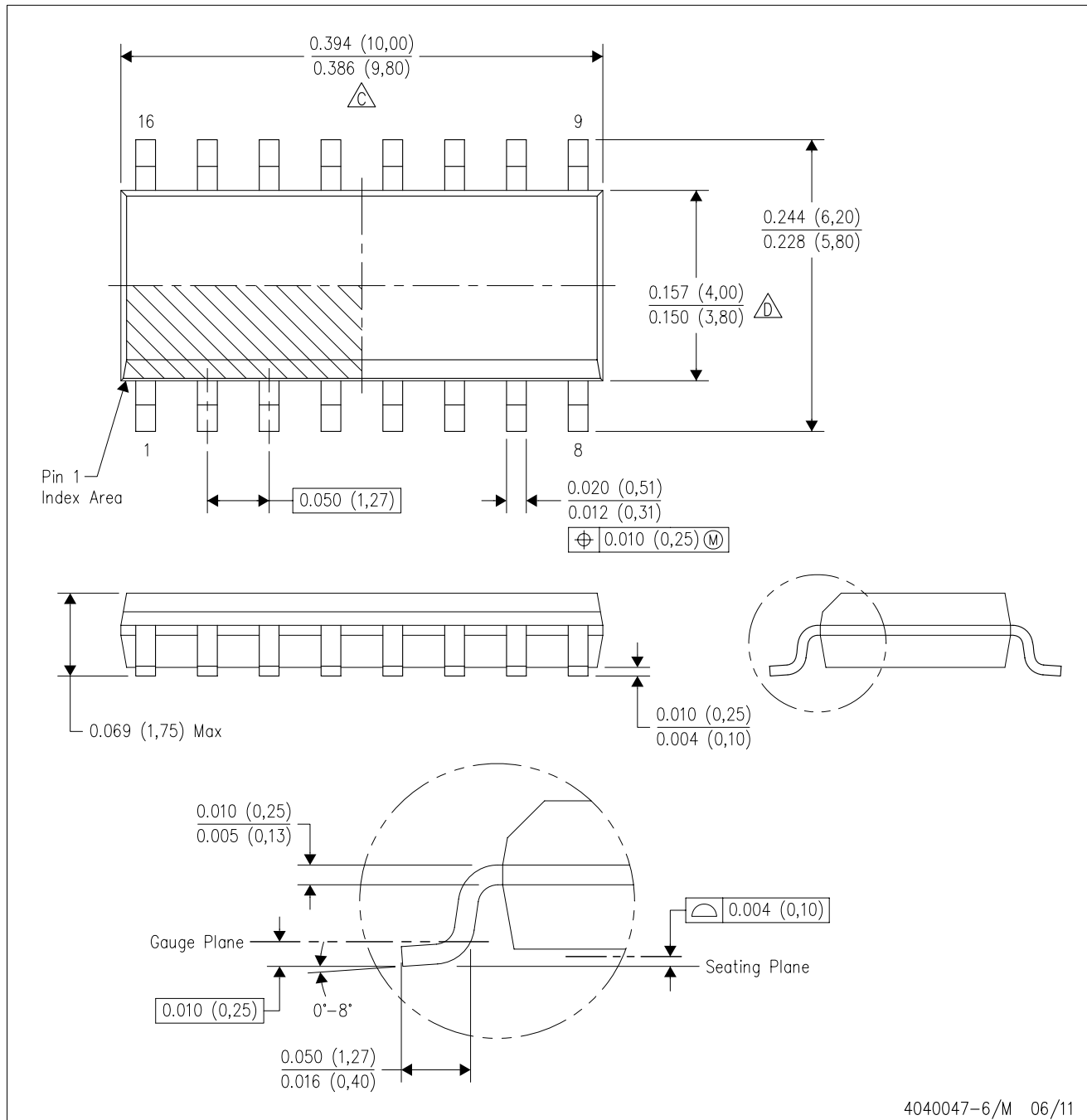
16 PINS SHOWN



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

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.



4220204/A 02/2017

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.

# EXAMPLE BOARD LAYOUT

PW0016A

TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE



LAND PATTERN EXAMPLE  
EXPOSED METAL SHOWN  
SCALE: 10X



SOLDER MASK DETAILS

4220204/A 02/2017

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

PW0016A

TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE



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

4220204/A 02/2017

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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