

## CD74AC174 Hex D-type Flip-Flop with Clear

### 1 Features

- AC types feature 1.5V to 5.5V operation and balanced noise immunity at 30% of the supply voltage
- Contains six flip-flops with single-rail outputs
- Buffered inputs
- Speed of Bipolar F, AS, and S, with significantly reduced power consumption
- Balanced propagation delays
- $\pm 24\text{mA}$  output drive current
  - Fanout to 15 F devices
- SCR-latchup-resistant CMOS process and circuit design

### 2 Application

- Buffer/Storage Registers
- [Shift Registers](#)

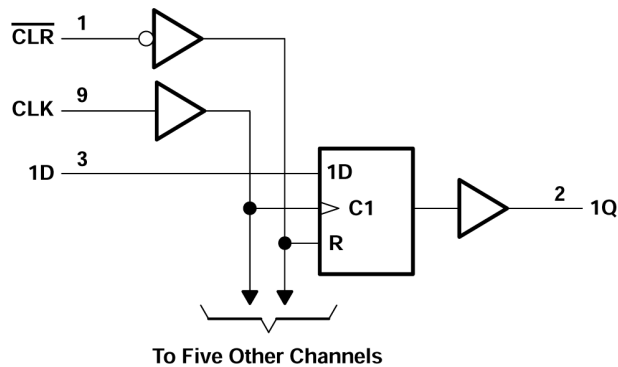
### 3 Description

The CD74AC174 is a positive-edge-triggered D-type flip-flop with a direct clear ( $\overline{\text{CLR}}$ ) input and is designed for 1.5V to 5.5V  $V_{\text{CC}}$  operation.

#### Package Information

PART NUMBER	PACKAGE <sup>(1)</sup>	PACKAGE SIZE <sup>(2)</sup>	BODY SIZE <sup>(3)</sup>
CD74AC174	BQB (WQFN, 16)	3.5mm × 2.5mm	3.5mm × 2.5mm
	D (SOIC, 16)	9.9mm × 6mm	9.9mm × 3.9mm
	N (PDIP, 16)	19.3mm × 9.4mm	19.3mm × 6.35mm
	PW (TSSOP, 16)	5mm × 6.4mm	5mm × 4.4mm

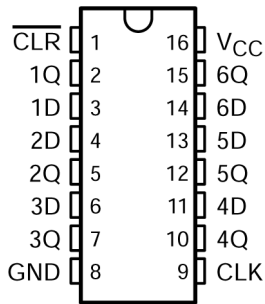
- (1) For more information, see [Section 11](#).
- (2) The package size (length × width) is a nominal value and includes pins, where applicable.
- (3) The body size (length × width) is a nominal value and does not include pins.



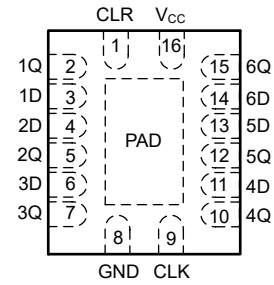
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## 4 Pin Configuration and Functions



**Figure 4-1. D, N, or PW Package; 16-Pin SOIC, PDIP, or TSSOP (Top View)**



**Figure 4-2. BQB Package, 16-Pin WQFN (Top View)**

**Table 4-1. Pin Functions**

PIN		TYPE	DESCRIPTION
NAME	NO.		
CLR	1	I	Clear Pin
1Q	2	O	1Q Output
1D	3	I	1D Input
2D	4	I	2D Input
2Q	5	O	2Q Output
3D	6	I	3D Input
3Q	7	O	3Q Output
GND	8	—	Ground Pin
CLK	9	I	Clock Pin
4Q	10	O	4Q Output
4D	11	I	4D Input
5Q	12	O	5Q Output
5D	13	I	5D Input
6D	14	I	6D Input
6Q	15	O	6Q Output
V <sub>CC</sub>	16	P	Power Pin

## 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 range	-0.5	6	V
I <sub>IK</sub>	Input clamp current	(V <sub>I</sub> < 0 V or V <sub>I</sub> > V <sub>CC</sub> ) <sup>(2)</sup>		±20 mA
I <sub>OK</sub>	Output clamp current	(V <sub>O</sub> < 0 V or V <sub>O</sub> > V <sub>CC</sub> ) <sup>(2)</sup>		±50 mA
I <sub>O</sub>	Continuous output current	(V <sub>O</sub> > 0 V or V <sub>O</sub> < V <sub>CC</sub> )		±50 mA
Continuous current through V <sub>CC</sub> or GND				±150 mA
T <sub>stg</sub>	Storage temperature range	-65	150	°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.
- (2) The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

### 5.2 ESD Ratings

			VALUE	UNIT
V <sub>(ESD)</sub>	Electrostatic discharge	Human body model (HBM), per ANSI/ESDA/JEDEC JS-001, all pins <sup>(1)</sup>	±2000	V

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

### 5.3 Recommended Operating Conditions

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

		T <sub>A</sub> = 25°C		-55°C to 125°C		-40°C to 85°C		UNIT
		MIN	MAX	MIN	MAX	MIN	MAX	
V <sub>CC</sub>	Supply voltage	1.5	5.5	1.5	5.5	1.5	5.5	V
V <sub>IH</sub>	High-level input voltage	V <sub>CC</sub> = 1.5 V		1.2		1.2		V
		V <sub>CC</sub> = 3 V		2.1		2.1		
		V <sub>CC</sub> = 5.5 V		3.85		3.85		
V <sub>IL</sub>	Low-level input voltage	V <sub>CC</sub> = 1.5 V		0.3		0.3		V
		V <sub>CC</sub> = 3 V		0.9		0.9		
		V <sub>CC</sub> = 5.5 V		1.65		1.65		
V <sub>I</sub>	Input voltage	0	V <sub>CC</sub>	0	V <sub>CC</sub>	0	V <sub>CC</sub>	V
V <sub>O</sub>	Output voltage	0	V <sub>CC</sub>	0	V <sub>CC</sub>	0	V <sub>CC</sub>	V
I <sub>OH</sub>	High-level output current	V <sub>CC</sub> = 4.5 V to 5.5 V		-24		-24		mA
I <sub>OL</sub>	Low-level output current	V <sub>CC</sub> = 4.5 V to 5.5 V		24		24		mA
Δt/Δv	Input transition rise or fall rate	V <sub>CC</sub> = 1.5 V to 3 V		50		50		ns/V
		V <sub>CC</sub> = 1.6 V to 5.5 V		20		20		

- (1) All unused inputs of the device must be held at V<sub>CC</sub> or GND to ensure proper device operation. Refer to the TI application report, *Implications of Slow or Floating CMOS Inputs*, literature number SCBA004.

### 5.4 Thermal Information

THERMAL METRIC <sup>(1)</sup>	CD74AC174				UNIT	
	BQB (WQFN)	D (SOIC)	N (PDIP)	PW (TSSOP)		
	16 PINS	16 PINS	16 PINS	16 PINS		
R <sub>θJA</sub>	Junction-to-ambient thermal resistance	91.2	106.6	67	126.2	°C/W

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

## 5.5 Electrical Characteristics

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

PARAMETER	TEST CONDITIONS		V <sub>CC</sub>	T <sub>A</sub> = 25 °C		–55°C to 125°C		–40°C to 85°C		UNIT
				MIN	MAX	MIN	MAX	MIN	MAX	
V <sub>OH</sub>	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>	I <sub>OH</sub> = -50 μA	1.5 V	1.4		1.4		1.4	V	
			3 V	2.9		2.9		2.9		
			4.5 V	4.4		4.4		4.4		
		I <sub>OH</sub> = -4 mA	3 V	2.58		2.4		2.48		
		I <sub>OH</sub> = -24 mA	4.5 V	3.94		3.7		3.8		
		I <sub>OH</sub> = -50 mA <sup>(1)</sup>	5.5 V			3.85				
		I <sub>OH</sub> = -75 mA <sup>(1)</sup>	5.5 V				3.85			
V <sub>OL</sub>	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>	I <sub>OL</sub> = 50 μA	1.5 V		0.1		0.1	0.1	V	
			3 V		0.1		0.1	0.1		
			4.5 V		0.1		0.1	0.1		
		I <sub>OL</sub> = 12 mA	3 V		0.36		0.5	0.44		
		I <sub>OL</sub> = 24 mA	4.5 V		0.36		0.5	0.44		
		I <sub>OL</sub> = 50 mA <sup>(1)</sup>	5.5 V				1.65			
		I <sub>OL</sub> = 75 mA <sup>(1)</sup>	5.5 V				1.65			
I <sub>I</sub>	V <sub>I</sub> = V <sub>CC</sub> or GND		5.5 V		±0.1		±1	±1	μA	
I <sub>CC</sub>	V <sub>I</sub> = V <sub>CC</sub> or GND, I <sub>O</sub> = 0		5.5 V		8		160	80	μA	
C <sub>i</sub>					10		10	10	pF	

(1) Test one output at a time, not exceeding 1-second duration. Measurement is made by forcing indicated current and measuring voltage to minimize power dissipation. Test verifies a minimum 50-Ω transmission-line drive capability at 85°C and 75-Ω transmission-line drive capability at 125°C.

## 5.6 Timing Requirements, V<sub>CC</sub> = 1.5 V

over recommended operating free-air temperature range, V<sub>CC</sub> = 1.5 V (unless otherwise noted)

			–55°C to 125°C		–40°C to 85°C		UNIT
			MIN	MAX	MIN	MAX	
f <sub>clock</sub>	Clock frequency		8		9		MHz
t <sub>w</sub>	Pulse duration		CLR low		50		ns
			CLK high or low		65		
T <sub>su</sub>	Setup time before CLK↑		Data		2		ns
t <sub>h</sub>	Hold time, data after CLK↑				38		ns
t <sub>rec</sub>	Recovery time, before CLK↑		CLR↑		1.5		ns

### 5.7 Timing Requirements, $V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$

over recommended operating free-air temperature range,  $V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$  (unless otherwise noted)

		–55°C to 125°C		–40°C to 85°C		UNIT
		MIN	MAX	MIN	MAX	
$f_{\text{clock}}$	Clock frequency	68		77		MHz
$t_w$	Pulse duration	CLR low		4.9		ns
		CLK high or low		6.4		
$T_{\text{su}}$	Setup time before CLK↑	Data		2		ns
$t_h$	Hold time, data after CLK↑	4.2		3.7		ns
$t_{\text{rec}}$	Recovery time, before CLK↑	CLR↑		1.5		ns

### 5.8 Timing Requirements, $V_{CC} = 5\text{ V} \pm 0.5\text{ V}$

over recommended operating free-air temperature range,  $V_{CC} = 5\text{ V} \pm 0.5\text{ V}$  (unless otherwise noted)

		–55°C to 125°C		–40°C to 85°C		UNIT
		MIN	MAX	MIN	MAX	
$f_{\text{clock}}$	Clock frequency	95		108		MHz
$t_w$	Pulse duration	CLR low		3.5		ns
		CLK high or low		4.6		
$t_{\text{su}}$	Setup time before CLK↑	Data		2		ns
$t_h$	Hold time, data after CLK↑	3		2.6		ns
$t_{\text{rec}}$	Recovery time, before CLK↑	CLR↑		1.5		ns

### 5.9 Switching Characteristics, $V_{CC} = 1.5\text{ V}$

over recommended operating free-air temperature range,  $V_{CC} = 1.5\text{ V}$ ,  $C_L = 50\text{ pF}$  (unless otherwise noted) (see [Load Circuit and Voltage Waveforms](#))

PARAMETER	FROM (INPUT)	TO (OUTPUT)	–55°C to 125°C		–40°C to 85°C		UNIT
			MIN	MAX	MIN	MAX	
$f_{\text{max}}$			8		9		MHz
$t_{\text{PLH}}$	CLK	Any Q	169		154		ns
$t_{\text{PHL}}$			169		154		
$t_{\text{PLH}}$	CLR	Any Q	181		165		ns
$t_{\text{PHL}}$			181		165		

### 5.10 Switching Characteristics, $V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$

over recommended operating free-air temperature range,  $V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$ ,  $C_L = 50\text{ pF}$  (unless otherwise noted) (see [Load Circuit and Voltage Waveforms](#))

PARAMETER	FROM (INPUT)	TO (OUTPUT)	–55°C to 125°C		–40°C to 85°C		UNIT
			MIN	MAX	MIN	MAX	
$f_{\text{max}}$			68		77		MHz
$t_{\text{PLH}}$	CLK	Any Q	4.7 18.9		4.9 17.2		ns
$t_{\text{PHL}}$			4.7 18.9		4.9 17.2		
$t_{\text{PLH}}$	CLR	Any Q	5.1 20.3		5.2 18.5		ns
$t_{\text{PHL}}$			5.1 20.3		5.2 18.5		

### 5.11 Switching Characteristics, $V_{CC} = 5\text{ V} \pm 0.5\text{ V}$

over recommended operating free-air temperature range,  $V_{CC} = 5\text{ V} \pm 0.5\text{ V}$ ,  $C_L = 50\text{ pF}$  (unless otherwise noted) (see [Load Circuit and Voltage Waveforms](#))

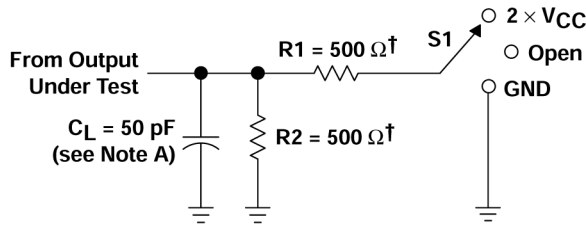
PARAMETER	FROM (INPUT)	TO (OUTPUT)	–55°C to 125°C		–40°C to 85°C		UNIT
			MIN	MAX	MIN	MAX	
$f_{max}$			95		108		MHz
$t_{PLH}$	CLK	Any Q	3.4	13.5	3.5	12.3	ns
$t_{PHL}$			3.4	13.5	3.5	12.3	
$t_{PLH}$	$\overline{\text{CLR}}$	Any Q	3.6	14.5	3.7	13.2	ns
$t_{PHL}$			3.6	14.5	3.7	13.2	

### 5.12 Operating Characteristics

$V_{CC} = 5\text{ V}$ ,  $T_A = 25^\circ\text{C}$

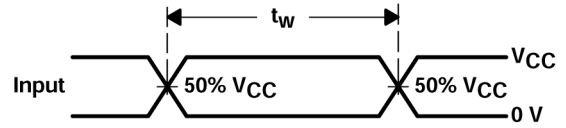
PARAMETER	TYP	UNIT
$C_{pd}$ Power dissipation capacitance	37	pF

## 6 Parameter Measurement Information

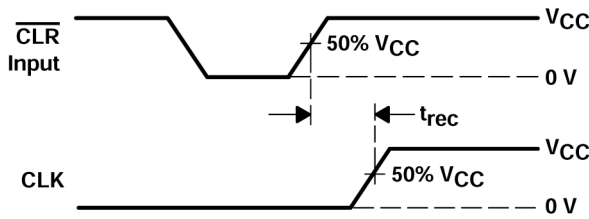


† When  $V_{CC} = 1.5\text{ V}$ ,  $R1 = R2 = 1\text{ k}\Omega$

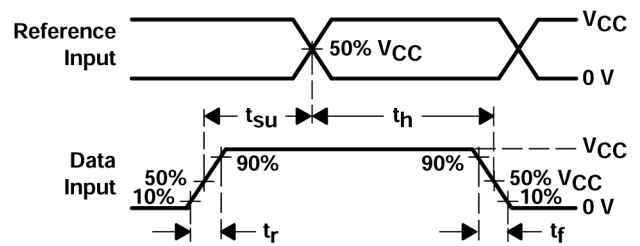
LOAD CIRCUIT



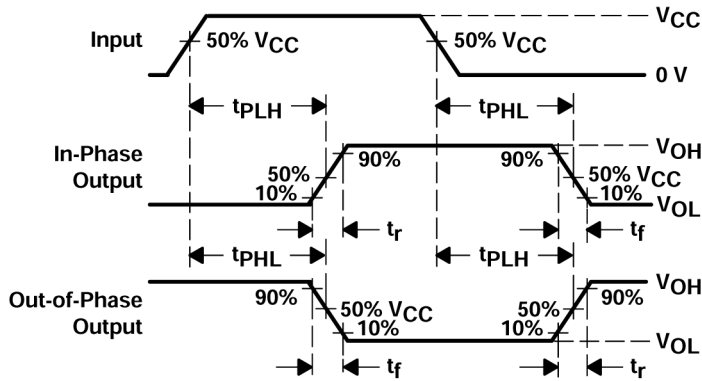
VOLTAGE WAVEFORMS  
PULSE DURATION



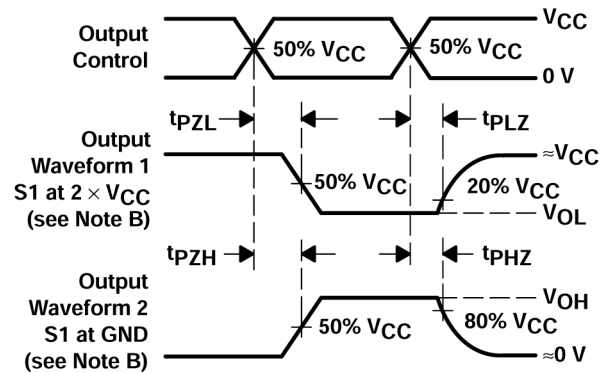
VOLTAGE WAVEFORMS  
RECOVERY TIME



VOLTAGE WAVEFORMS  
SETUP AND HOLD AND INPUT RISE AND FALL TIMES



VOLTAGE WAVEFORMS  
PROPAGATION DELAY AND OUTPUT TRANSITION TIMES



VOLTAGE WAVEFORMS  
OUTPUT ENABLE AND DISABLE TIMES

Figure 6-1. Load Circuit and Voltage Waveforms



- A.  $C_L$  includes probe and test-fixture capacitance.
- B. Waveform 1 is for an output with internal conditions such that the output is low except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high except when disabled by the output control.
- C. All input pulses are supplied by generators having the following characteristics:  $PRR \leq 1$  MHz,  $Z_O = 50 \Omega$ ,  $t_r = 3$  ns,  $t_f = 3$  ns. Phase relationships between waveforms are arbitrary.
- D. For clock inputs,  $f_{max}$  is measured with the input duty cycle at 50%.
- E. The outputs are measured one at a time with one input transition per measurement.
- F.  $t_{PLH}$  and  $t_{PHL}$  are the same as  $t_{pd}$ .
- G.  $t_{PZL}$  and  $t_{PZH}$  are the same as  $t_{en}$ .
- H.  $t_{PLZ}$  and  $t_{PHZ}$  are the same as  $t_{dis}$ .
- I. All parameters and waveforms are not applicable to all devices.

TEST	S1
$t_{PLH}/t_{PHL}$	Open
$t_{PLZ}/t_{PZL}$	$2 \times V_{CC}$
$t_{PHZ}/t_{PZH}$	GND

## 7 Detailed Description

### 7.1 Overview

Information at the data (D) inputs that meets the setup time requirements is transferred to the outputs on the positive-going edge of the clock (CLK) pulse. Clock triggering occurs at a particular voltage level and is not directly related to the transition time of the positive-going edge of CLK. When CLK is at either the high or low level, the D input has no effect at the output.

### 7.2 Functional Block Diagram

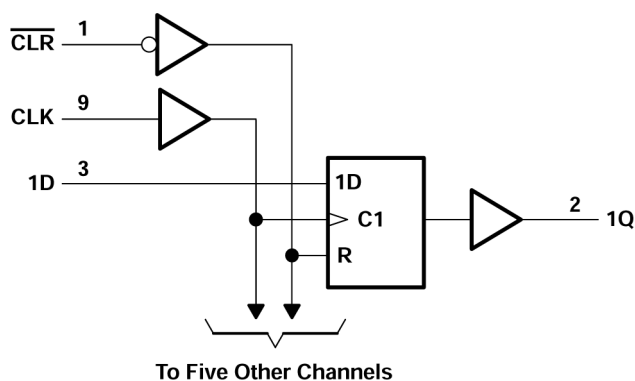


Figure 7-1. Logic Diagram (Positive Logic)

### 7.3 Device Functional Modes

Table 7-1. Function Table (Each Flip-flop)

INPUTS			OUTPUT
CLR	CLK	D	Q
L	X	X	L
H	↑	H	H
H	↑	L	L
H	L	X	Q <sub>0</sub>

## 8 Application and Implementation

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### 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.

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### 8.1 Power Supply Recommendations

The power supply can be any voltage between the min and max supply voltage rating located in [Section 5.3](#).

Each  $V_{CC}$  terminal should have a good bypass capacitor to prevent power disturbance. For devices with a single supply, TI recommends 0.1  $\mu\text{F}$  and if there are multiple  $V_{CC}$  terminals, then TI recommends .01  $\mu\text{F}$  or .022  $\mu\text{F}$  for each power terminal. It is okay to parallel multiple bypass capacitors to reject different frequencies of noise. A 0.1  $\mu\text{F}$  and 1  $\mu\text{F}$  are commonly used in parallel. The bypass capacitor should be installed as close to the power terminal as possible for best results.

### 8.2 Layout

#### 8.2.1 Layout Guidelines

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

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

## 9 Device and Documentation Support

### 9.1 Documentation Support (Analog)

#### 9.1.1 Related Documentation

The table below lists quick access links. Categories include technical documents, support and community resources, tools and software, and quick access to sample or buy.

**Table 9-1. Related Links**

PARTS	PRODUCT FOLDER	SAMPLE & BUY	TECHNICAL DOCUMENTS	TOOLS & SOFTWARE	SUPPORT & COMMUNITY
CD74AC174	<a href="#">Click here</a>	<a href="#">Click here</a>	<a href="#">Click here</a>	<a href="#">Click here</a>	<a href="#">Click here</a>

### 9.2 Receiving Notification of Documentation Updates

To receive notification of documentation updates, navigate to the device product folder on [ti.com](http://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.

### 9.3 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](#).

### 9.4 Trademarks

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

### 9.5 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.

### 9.6 Glossary

[TI Glossary](#) This glossary lists and explains terms, acronyms, and definitions.

## 10 Revision History

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

Changes from Revision B (April 2024) to Revision C (October 2024)	Page
• Added BQB and PW packages to <i>Package Information</i> table, <i>Pin Configuration and Functions</i> section, and <i>Thermal Information</i> table.....	1

Changes from Revision A (November 2023) to Revision B (April 2024)	Page
• Updated thermal values for D package from RθJA = 73 to 106.6, all values in °C/W .....	4

## 11 Mechanical, Packaging, and Orderable Information

The following pages include mechanical, packaging, and orderable information. This information is the most current data available for the designated devices. This data is subject to change without notice and revision of this document. For browser-based versions of this data sheet, refer to the left-hand navigation.

**PACKAGING INFORMATION**

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead finish/ Ball material (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
CD74AC174BQBR	ACTIVE	WQFN	BQB	16	3000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-55 to 125	AC174	<a href="#">Samples</a>
CD74AC174E	ACTIVE	PDIP	N	16	25	RoHS & Green	NIPDAU	N / A for Pkg Type	-55 to 125	CD74AC174E	<a href="#">Samples</a>
CD74AC174M	OBSOLETE	SOIC	D	16		TBD	Call TI	Call TI	-55 to 125	AC174M	
CD74AC174M96	ACTIVE	SOIC	D	16	2500	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-55 to 125	AC174M	<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 <=1000ppm threshold. Antimony trioxide based flame retardants must also meet the <=1000ppm threshold requirement.

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

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

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

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

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## 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
CD74AC174BQBR	WQFN	BQB	16	3000	180.0	12.4	2.8	3.8	1.2	4.0	12.0	Q1
CD74AC174M96	SOIC	D	16	2500	330.0	16.4	6.5	10.3	2.1	8.0	16.0	Q1
CD74AC174M96	SOIC	D	16	2500	330.0	12.4	3.75	3.75	1.15	8.0	12.0	Q1
CD74AC174M96	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)
CD74AC174BQBR	WQFN	BQB	16	3000	210.0	185.0	35.0
CD74AC174M96	SOIC	D	16	2500	353.0	353.0	32.0
CD74AC174M96	SOIC	D	16	2500	340.5	336.1	32.0
CD74AC174M96	SOIC	D	16	2500	353.0	353.0	32.0

**TUBE**


\*All dimensions are nominal

Device	Package Name	Package Type	Pins	SPQ	L (mm)	W (mm)	T (μm)	B (mm)
CD74AC174E	N	PDIP	16	25	506	13.97	11230	4.32
CD74AC174E	N	PDIP	16	25	506	13.97	11230	4.32

D (R-PDSO-G16)

PLASTIC SMALL OUTLINE



4040047-6/M 06/11

- 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.

## GENERIC PACKAGE VIEW

**BQB 16**

**WQFN - 0.8 mm max height**

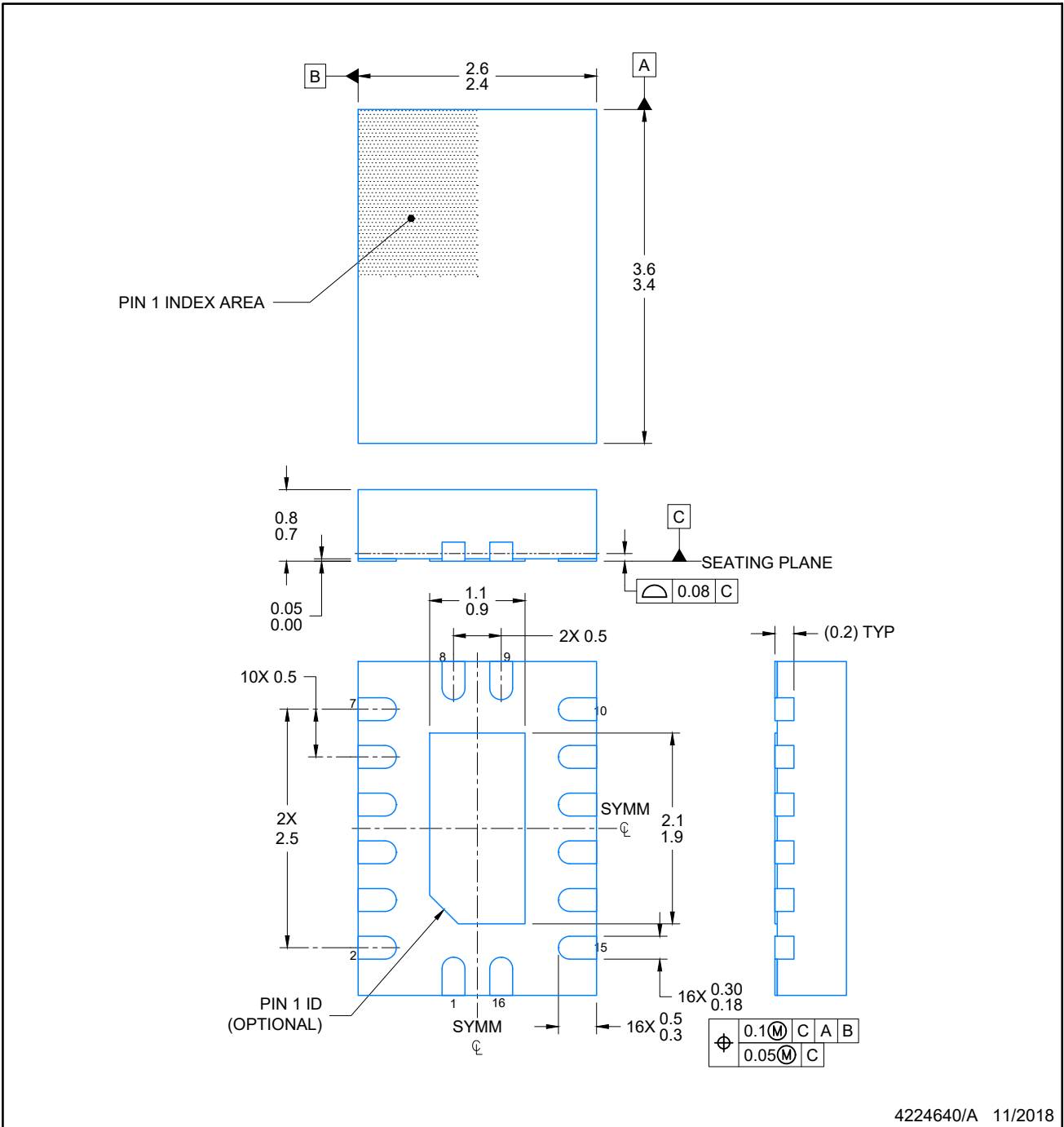
2.5 x 3.5, 0.5 mm pitch

PLASTIC QUAD FLATPACK - NO LEAD

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



4226161/A



NOTES:

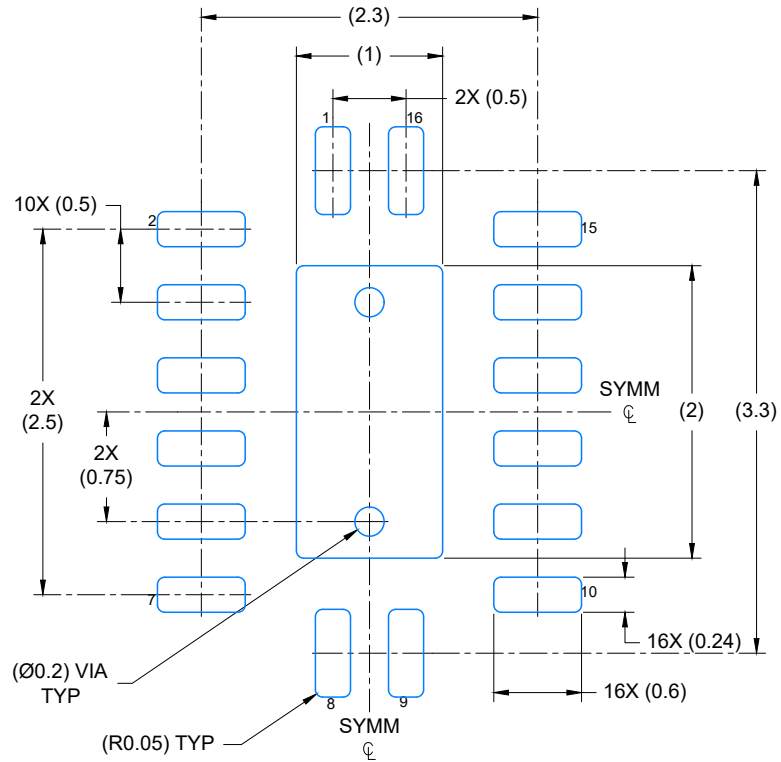
1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. The package thermal pad must be soldered to the printed circuit board for optimal thermal and mechanical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

# EXAMPLE BOARD LAYOUT

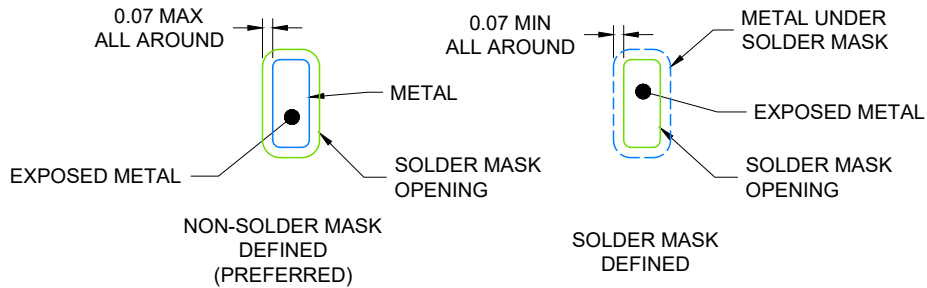
BQB0016A

WQFN - 0.8 mm max height

PLASTIC QUAD FLAT PACK-NO LEAD



LAND PATTERN EXAMPLE  
EXPOSED METAL SHOWN  
SCALE: 20X



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NOTES: (continued)

4. This package is designed to be soldered to a thermal pad on the board. For more information, see Texas Instruments literature number SLUA271 ([www.ti.com/lit/sluea271](http://www.ti.com/lit/sluea271)).
5. Vias are optional depending on application, refer to device data sheet. If any vias are implemented, refer to their locations shown on this view. It is recommended that vias under paste be filled, plugged or tented.

# EXAMPLE STENCIL DESIGN

**BQB0016A**

**WQFN - 0.8 mm max height**

PLASTIC QUAD FLAT PACK-NO LEAD



**SOLDER PASTE EXAMPLE**  
 BASED ON 0.125 mm THICK STENCIL

EXPOSED PAD  
 85% PRINTED COVERAGE BY AREA  
 SCALE: 20X

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NOTES: (continued)

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

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.



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