

CDx4AC299, CD74AC323, CDx4ACT299 8-Lnput Universal Shift/Storage Register with Common Parallel I/O Pins

1 Features

Type Features

- **Buffered** inputs
- Typical propagation delay:

6ns @
$$V_{CC} = 5V$$
, $T_A = 25$ °C, $C_L = 50pF$

Family Features

- SCR-Latchup-resistant CMOS process and circuit design
- Speed of bipolar FAST*/AS/S with significantly reduced power consumption
- Balanced propagation delays
- AC types feature 1.5V to 5.5V operation and balanced noise immunity at 30% of the supply
- ± 24mA output drive current
 - Fanout to 15 FAST* ICs
 - Drives 50ohm transmission lines

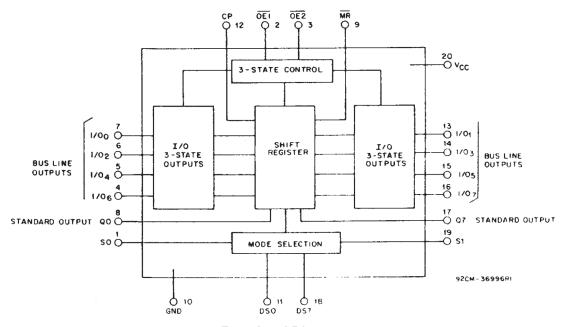
2 Description

The RCA CDx4AC299 and CD74AC323 and the CDx4ACT299 are 3-state, 8-input universal shift/ storage registers with common parallel I/O pins.

Device Information

PART NUMBER	PACKAGE ⁽¹⁾	PACKAGE SIZE(2)	BODY SIZE(3)
CDx4AC(T)299/ CD74AC323	DW (SOIC, 20)	12.80mm × 10.3mm	12.80mm × 7.50mm

- (1) For all available packages, see the orderable addendum at the end of the data sheet.
- The package size (length × width) is a nominal value and includes pins, where applicable.
- The body size (length × width) is a nominal value and does not include pins.



Functional Diagram



Table of Contents

1 Features1	6.2 Functional Block Diagram	9
2 Description1	6.3 Device Functional Modes	10
3 Pin Configuration and Functions3	7 Application and Implementation	11
4 Specifications4	7.1 Power Supply Recommendations	11
4.1 Absolute Maximum Ratings4	7.2 Layout	11
4.2 ESD Ratings4	8 Device and Documentation Support	13
4.3 Recommended Operating Conditions:4	8.1 Documentation Support (Analog)	13
4.4 Thermal Information4	8.2 Receiving Notification of Documentation Updates	13
4.5 Static Electrical Characteristics, AC Series5	8.3 Support Resources	13
4.6 Static Electrical Characteristics, ACT Series6	8.4 Trademarks	13
4.7 Switching Characteristics, AC Series7	8.5 Electrostatic Discharge Caution	13
4.8 Switching Characteristics, ACT Series7	8.6 Glossary	13
5 Parameter Measurement Information8	9 Revision History	13
6 Detailed Description9	10 Mechanical, Packaging, and Orderable	
6.1 Overview9	Information	14



3 Pin Configuration and Functions

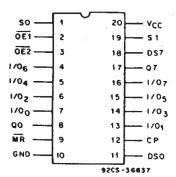


Figure 3-1. Terminal Assignment

Pin Functions

PIN TYPE ¹		TVDE1	DESCRIPTION
NO.	NAME	ITPE	DESCRIPTION
1	so	I	Mode select 0
2	!OE1	I	Output enable, active low
3	!OE2	I	Output enable, active low
4	I/O6	0	Parallel data input/output
5	1/04	0	Parallel data input/output
6	I/O2	0	Parallel data input/output
7	I/O0	0	Parallel data input/output
8	Q0	0	Serial output
9	!MR	I	Master reset, active low
10	GND	-	Ground
11	DSO	I	Serial data input
12	СР	I	Clock, rising edge triggered
13	I/O1	0	Parallel data input/output
14	I/O3	0	Parallel data input/output
15	I/O5	0	Parallel data input/output
16	1/07	0	Parallel data input/output
17	Q7	0	Serial output
18	DS7	I	Serial data input
19	S1	I	Mode select
20	V _{CC}	-	Supply

(1) Signal Types: I = Input, O = Output, I/O = Input or Output



4 Specifications

4.1 Absolute Maximum Ratings

			MIN	MAX	UNIT
V _{CC}	Supply voltage range		-0.5	7	V
I _{IK}	Input diode current	$(V_1 < -0.5 \text{ V or } V_1 > V_{CC} \pm 0.5 \text{ V})$		±20	mA
I _{OK}	Output diode current	$(V_O < -0.5 \text{ V or } V_O > V_{CC} + 0.5 \text{ V})$		±50	mA
Io	Output source or sink current per output pin	$(V_O > -0.5 \text{ V or } V_O < V_{CC} + 0.5 \text{ V})$		±50	mA
	V _{CC} or ground current, I _{CC} or I _{GND}			±100	mA ⁽¹⁾
T _A	Operating-temperature range		-55	+125	°C
T _{stg}	Storage temperature		-65	+150	°C

⁽¹⁾ For up to 4 outputs per device; add \pm 25 mA for each additional output.

4.2 ESD Ratings

			VALUE	UNIT
$V_{(ESD)}$	Electrostatic discharge	Human body model (HBM), per ANSI/ESDA/JEDEC JS-001 ⁽¹⁾	±2000	V

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

4.3 Recommended Operating Conditions:

For maximum reliability, normal operating conditions should be selected so that operation is always within the following ranges:

		MIN	MAX	UNIT
	Supply-Voltage :			
(1)	(For T _A = Full Package-Temperature Range)			
V _{CC} ⁽¹⁾	AC Types	1.5	5.5	V
	ACT Types	4.5	5.5	V
V _I , V _O	Input or Output voltage	0	V _{CC}	V
T _A	Operating Temperature	-55	+125	°C
	Input Rise and Fall Slew Rate			
dt/dv	at 1.5 V to 3 V (AC Types)	0	50	ns/V
avav	at 3.6 V to 5.5 V (AC Types)	0	20	ns/V
	at 4.5 V to 5.5 V (ACT Types)	0	10	ns/V

⁽¹⁾ Unless otherwise specified, all voltages are referenced to ground.

4.4 Thermal Information

	THERMAL METRIC ⁽¹⁾	CDx4AC(T)299/ CD74AC323 DW (SOIC, 20) 20 PINS	UNIT
$R_{\theta JA}$	Junction-to-ambient thermal resistance	40	°C/W

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



4.5 Static Electrical Characteristics, AC Series

		TEOT 001	IDITIONS		A	AMBIENT TEMPERATURE (T _A) - °C					
	CHARACTERISTICS	TEST CON	IDITIONS	V _{CC} (V)	+25	;	-40 to	+85	-55 to +	-125	UNIT
		V _I (V)	I _O (mA)		MIN	MAX	MIN	MAX	MIN	MAX	
				1.5	1.2	_	1.2	_	1.2	_	
V _{IH}	V _{IH} High-Level Input Voltage			3	2.1	_	2.1	_	2.1	_	V
	vollago			5.5	3.85	_	3.85	_	3.85	_	
				15	_	0.3	_	0.3	_	0.3	
V _{IL}	Low-Level Input Voltage			3	_	0.9	_	0.9		0.9	V
	venage			5.5	_	1.65	_	1.65		1.65	
			-0.05	1.5	1.4	_	1.4	_	1.4	_	
			-0.05	3	2.9	_	2.9	_	2.9	_	
		V_{IH} or V_{IL}	-0.05	4.5	4.4	_	4.4	_	4.4	_	
V _{OH}	High-Level Output		-4	3	2.58	_	2.48	_	2.4	_	V
VOH	Voltage		-24	4.5	3.94	_	3.8	_	3.7	_	•
		(1) (2)	-75	5.5	_	_	3.85	_	_	_	
		{	-50	5.5	_	_	_	_	3.85	_	
			0.05	1.5	_	0.1	_	0.1	_	0.1	
			0.05	3	_	0.1	_	0.1	_	0.1	
		V_{IH} or V_{IL}	0.05	4.5	_	0.1	_	0.1	_	0.1	
V _{OL}	Low-Level Output		12	3	_	0.36	_	0.44	_	0.5	V
VOL	Voltage		24	4.5	_	0.36	_	0.44	_	0.5	v
		(1) (2)	75	5.5	_	_	_	1.65	_	_	
		{	50	5.5		_	_	_		1.65	
I _I	Input Leakage Current	V _{CC} or GND		5.5	_	±0.1	_	±1	_	±1	μΑ
I _{OZ}	3-Stage Leakage Current	V _{IH} or V _{IL} V _O = V _{CC} or GND		5.5	_	±0.5	_	±5	_	±10	μΑ
Ice	Quiescent Supply Current, MSI	V _{CC} or GND	0	5.5	_	8	_	80	_	160	μΑ

⁽¹⁾ Test one output at a time for a 1-second maximum duration. Measurement is made by forcing current and measuring voltage to minimize power dissipation.

⁽²⁾ Test verifies a minimum 50-ohm transmission-line-drive capability at +85°C, 75 ohms at +125°C.



4.6 Static Electrical Characteristics, ACT Series

		TEST COL	TEST CONDITIONS			AMBIEN	T TEMPER	ATURE (T _A) - °C		
	CHARACTERISTICS	IESI CON	IDITIONS	V _{CC} (V)	+25		-40 to	+85	-55 to +	125	UNIT
		V _I (V)	I _O (mA)		MIN	MAX	MIN	MAX	MIN	MAX	
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
		\/ or\/	-0.05	4.5	4.4	_	4.4	_	4.4	_	
	I Bala I arrel Ordanid	V _{IH} or V _{IL}	-24	4.5	3.94	_	3.8	_	3.7	_	
V _{OH}	High-Level Output Voltage	(1) (2)	-75	5.5	_	_	3.85	_	_	_	V
Vollago	{	-50	5.5	_	_	_	_	3.85	_		
		\/ or\/	0.05	4.5	_	0.1	_	0.1	_	0.1	
		V _{IH} or V _{IL}	24	4.5	_	0.36	_	0.44	_	0.5	
V _{OL}	Low-Level Output Voltage	(1) (2)	75	5.5	_	_	_	1.65	_	_	V
	Ç	{	50	5.5	_	_	_	_		1.65	
I	Input Leakage Current	V _{CC} or GND		5.5	_	±0.1	_	±1	_	±1	μΑ
I _{OZ}	3-State Leakage Current	V _{IH} or V _{IL} V _O V _{CC} or GND		5.5	_	±0.5	_	±5	_	±10	μΑ
I _{CC}	Quiescent Supply Current, MSI	V _{CC} or GND	0	5.5	_	8	_	80	_	160	μΑ
	Additional Quiescent Supply Current per Input Pin	V _{CC} -2.1		4.5 to	_	2.4	_	2.8	_	3	mA
ΔI _{CC}	TTL Inputs High			5.5							
	1 Unit Load										

⁽¹⁾ Test one output at a time for a 1-second maximum duration. Measurement is made by forcing current and measuring voltage to minimize power dissipation.

Table 4-1. Act Input Loading Table

INPUT	UNIT LOADS (1)		
	299	323	
S1.S0, OE1 , OE2	0.83	0.83	
I/O ₀ - I/O ₇ , CP, DS0, DS7	0.67	067	
MR	1.33	067	

⁽¹⁾ Unit load is ΔI_{CC} limit specified in Static Characteristics Chart, e.g., 2.4 mA max. @ 25°C.

⁽²⁾ Test verifies a minimum 50-ohm transmission-line-drive capability at +85°C, 75 ohms at + 125°C.



4.7 Switching Characteristics, AC Series

 t_r , t_l = 3 ns, C_L = 50 pF

ι, η στιο, σ <u>ι</u>			AMBIEN	T TEMPER	RATURE (T _A) - °	С	
SYMBOL	CHARACTERISTICS	V _{CC} (V)	-40 to +8	35	-55 to +12	UNIT	
			MIN	MAX	MIN	MAX	
		1.5	_	147	_	162	
t _{PLH}	Propagation Delays: CP to Q0, Q7	3.3 (1)	4.7	16.5	4.5	18.1	ns
t _{PHL}		5 ⁽²⁾	3.3	11.7	3.2	12.9	
		1.5	_	154		169	
t _{PLH}	CP to (I/O)n	3.3	4.9	17.2	4.7	18.9	ns
t _{PHL}		5	3.5	12.3	3.4	13.5	
		1.5	_	127	_	140	
t _{PLH}	MR to Q0, Q7 (299 only)	3.3	4	14.3	3.9	15.7	ns
t _{PHL}		5	2.9	10.2	2.8	11.2	
		1.5	_	158	_	174	
t _{PLH}	MR to (I/O)n	3.3	5	17.7	4.9	19.5	ns
t _{PHL}		5	3.6	12.6	3.5	13.9	
t _{PZL}		1.5		169		186	
t _{PZH}	Enable and Disable Times	3.3	5.8	20.4	5.6	22.4	ns
t _{PLZ} t _{PHZ}		5	3.8	13.5	3.7	14.9	
C _{pd} (3)	Power Dissipation Capacitance	_	280 Тур).	280 Typ.		pF
C _I	Input Capacitance	_	_	10	_	10	pF
Co	3-State Output Capacitance	_	_	15	_	15	pF

^{(1) 3.3} V: min. is @ 3.6 V

4.8 Switching Characteristics, ACT Series

 t_r , t_l = 3 ns, C_L = 50 pF

			AMBIENT TEMPERATURE (T _A) - °C					
SYMBOL	CHARACTERISTICS	V _{CC} (V)	-40 to +85		-55 to +125		UNIT	
			MIN	MAX	MIN	MAX		
t _{PLH} t _{PHL}	Propagation Delays: CP to Q0, Q7	5 ⁽¹⁾	3.3	11.7	3.2	12.9	ns	
t _{PLH} t _{PHL}	CP to (I/O)n	5	3.7	13.2	3.6	14.5	ns	
t _{PLH} t _{PHL}	MR to Q0, Q7 (299 only)	5	3.1	11.1	3.1	12.2	ns	
t _{PLH} t _{PHL}	MR to (I/O)n	5	4.8	16.9	4.7	18.6	ns	
t _{PLZ} t _{PHZ} t _{PZL}	Enable and Disable Times	5	3.8	13.5	3.7	14.9	ns	
C _{PD} §	Power Dissipation Capacitance	_	280 Typ.		280 Typ).	pF	
Cı	Input Capacitance	_	_	10	_	10	pF	
Co	3-State Output Capacitance	_	_	15	_	15	pF	

(1) 5 V: min. is @ 5.5 V

 ^{(2) 5} V: min. is @ 5.5 V
 (3) C_{pd} is used to determine the dynamic power consumption, per function.



5 Parameter Measurement Information

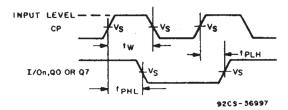


Figure 5-1. Clock Prerequisite and Propagation Delays

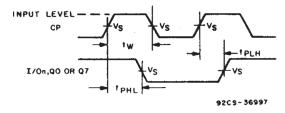
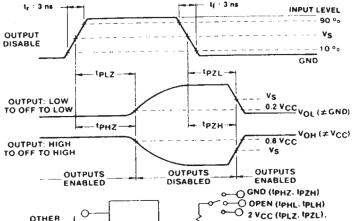


Figure 5-2. Clock Prerequisite and Propagation Delays



OUTPUTS
ENABLED

OUTPUTS
ENABLED

OUTPUTS
ENABLED

OUTPUTS
ENABLED

OUTPUTS
ENABLED

OUTPUTS
ENABLED

OUTPUTS

Figure 5-3. Three-state Propagation Delay Times and Test Circuit

*FOR AC SERIES ONLY: WHEN VCC = 1.5 V, RL = 1 k Ω

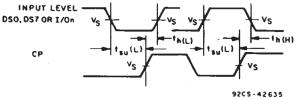


Figure 5-4. Data Prerequisite Times

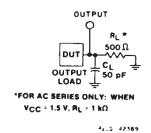


Figure 5-5. Test Circuit

	CD54/74AC	CD54/74ACT
Input Level	V _{CC}	3 V
Input Switching Voltage, V _S	0.5 V _{CC}	1.5 V
Output Switching Voltage, V _S	0.5 V _{CC}	0.5 V _{CC}



6 Detailed Description

6.1 Overview

The RCA CD54/74AC299 and CD54/74AC323 and the CD54/74ACT299 and CD54/74ACT323 are 3-state, 8-input universal shift/storage registers with common parallel I/O pins. These devices use the RCA ADVANCED CMOS technology. These registers have four synchronous-operating modes controlled by the two select inputs as shown in the Mode Select (S0, S1) table. The Mode Select, the Serial Data (DSO, DS7), and the Parallel Data (I/O $_0$ - I/O $_7$) respond only to the LOW-TO-HIGH transition of the clock (CP) pulse. S0, S1 and Data inputs must be present one setup time prior to the positive transition of the clock.

With the CD54/74AC/ACT299, the Master Reset (\overline{MR}) is an asynchronous active-LOW input. When \overline{MR} is LOW, the register is cleared regardless of the status of all other inputs With the CD54/74AC/ACT323, the Master Reset (\overline{MR}) clears the register in sync with the clock input. The register can be expanded by cascading same units by tying the serial output (QO) to the serial data (DS7) input of the preceding register, and tying the serial output (Q7) to the serial data (DSO) input of the following register. Recirculating the (n x 8) bits is accomplished by tying the Q7 of the last stage to the DSO of the first stage.

The 3-state input/output (I/O) port has three modes of operation:

- 1. Both Output Enable (OE1 and OE2) inputs are LOW and S0 or S1 or both are LOW; the data in the register is present at the eight outputs.
- 2. When both S0 and S1 are HIGH, I/O terminals are in the high-impedance state but being input ports, ready for parallel data to be loaded into eight registers with one clock transition regardless of the status of OE1 and OE2.
- 3. Either one of the two Output Enable inputs being HIGH will force I/O terminals to be in the off state. It is noted that each I/O terminal is a 3-state output and a CMOS buffer input.

The CD74AC/ACT299 and CD74AC/ACT323 are supplied in 20-lead dual-in-line plastic packages (E suffix) and in 20-lead dual-in-line small-outline plastic packages (M suffix). Both package types are operable over the following temperature ranges: Commercial (0 to 70°C); Industrial (-40 to +85° C); and Extended Industrial/Military (-55 to +125° C).

The CD54AC/ACT299 and CD54AC/ACT323, available in chip form (H suffix), are operable over the -55 to +125°C temperature range.

6.2 Functional Block Diagram

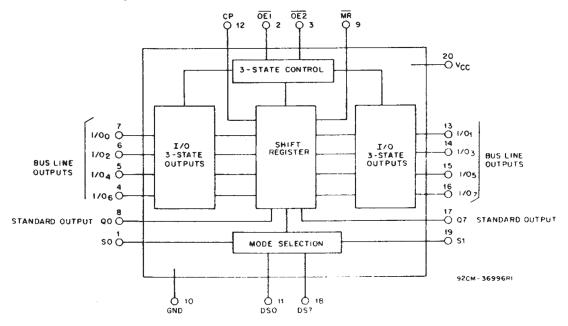


Figure 6-1. Functional Diagram



6.3 Device Functional Modes

FUNCTION		INPUTS									REGISTER OUTPUTS				
FUNCTION	MR	СР	S0	S1	DS0	DS7	I/O _n	Q0	Q1		Q6	Q7			
Reset (Clear)	L	X ⁽¹⁾	Х	Х	Х	Х	Х	L	L		L	L			
Shift Right	Н		h	ı	I	Х	Х	L	q ₀		q ₅	q ₆			
	Н		h	I	h	Х	Х	Н	q ₀		q ₅	q ₆			
Shift Left	Н		I	h	Х	I	Х	q ₁	q ₂		q ₇	L			
	Н		I	h	Х	h	Х	q_1	q_2		q ₇	Н			
Hold (do nothing)	Н		I	ı	Х	Х	Х	q ₀	q ₁		q ₆	q ₇			
Parallel Load	Н		h	h	Х	Х	I	L	L		L	L			
	Н		h	h	Х	Х	h	Н	Н		Н	Н			

Table 6-1. Mode Select

Function table 3-state I/O port operating mode

FUNCTION		INPUTS/OUTPUTS				
FUNCTION	OE1	OE2	S0	S1	Qn (Register)	I/O ₀ I/O ₇
Read	L	L	L	Х	L	L
Register	L	L	L	Х	Н	Н
	L	L	Х	L	L	L
	L	L	Х	L	Н	Н
Load Register	Х	Х	Н	Н	Qn = I/O _n	I/O _n = Inputs
Disable I/O	Н	Х	Х	Х	X	(Z)
	Х	Н	Х	Х	X	(Z)

⁽¹⁾ H = Input voltage high level.



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

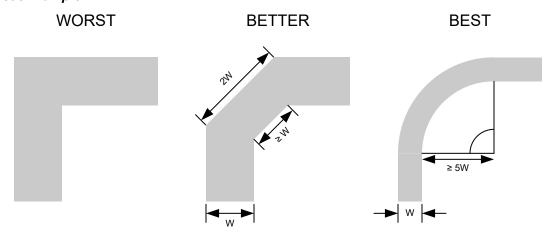


Figure 7-1. Example Trace Corners for Improved Signal Integrity



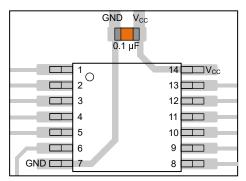


Figure 7-2. Example Bypass Capacitor Placement for TSSOP and Similar Packages

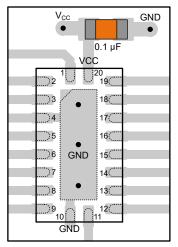


Figure 7-3. Example Bypass Capacitor Placement for WQFN and Similar Packages

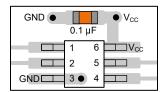


Figure 7-4. Example Bypass Capacitor Placement for SOT, SC70 and Similar Packages



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



8 Device and Documentation Support

8.1 Documentation Support (Analog)

8.1.1 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 8-1. Related Links

PARTS	PRODUCT FOLDER	SAMPLE & BUY	TECHNICAL DOCUMENTS	TOOLS & SOFTWARE	SUPPORT & COMMUNITY
CD54AC299	Click here	Click here	Click here	Click here	Click here
CD74AC299	Click here	Click here	Click here	Click here	Click here
CD54ACT299	Click here	Click here	Click here	Click here	Click here
CD74ACT299	Click here	Click here	Click here	Click here	Click here
CD74AC323	Click here	Click here	Click here	Click here	Click here

8.2 Receiving Notification of Documentation Updates

To receive notification of documentation updates, navigate to the device product folder on ti.com. Click on *Subscribe to updates* 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 * (April 2002) to Revision A (December 2024)

Page



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.

www.ti.com 8-Nov-2025

PACKAGING INFORMATION

Orderable part number	Status	Material type	Package Pins	Package qty Carrier	RoHS	Lead finish/ Ball material	MSL rating/ Peak reflow	Op temp (°C)	Part marking
	(1)	(2)			(0)	(4)	(5)		(0)
CD54AC299F3A	Active	Production	CDIP (J) 20	20 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	CD54AC299F3A
CD54AC299F3A.A	Active	Production	CDIP (J) 20	20 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	CD54AC299F3A
CD54ACT299F3A	Active	Production	CDIP (J) 20	20 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	CD54ACT299F3A
CD54ACT299F3A.A	Active	Production	CDIP (J) 20	20 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	CD54ACT299F3A
CD74AC299M96	Active	Production	SOIC (DW) 20	2000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-55 to 125	AC299M
CD74AC299M96.A	Active	Production	SOIC (DW) 20	2000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-55 to 125	AC299M
CD74AC323M	Active	Production	SOIC (DW) 20	25 TUBE	Yes	NIPDAU	Level-1-260C-UNLIM	-55 to 125	AC323M
CD74AC323M.A	Active	Production	SOIC (DW) 20	25 TUBE	Yes	NIPDAU	Level-1-260C-UNLIM	-55 to 125	AC323M
CD74ACT299M96	Active	Production	SOIC (DW) 20	2000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-55 to 125	ACT299M
CD74ACT299M96.A	Active	Production	SOIC (DW) 20	2000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-55 to 125	ACT299M

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

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.

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⁽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.

PACKAGE OPTION ADDENDUM

www.ti.com 8-Nov-2025

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 CD54AC299, CD54ACT299, CD74AC299, CD74ACT299:

Catalog: CD74AC299, CD74ACT299

Military: CD54AC299, CD54ACT299

NOTE: Qualified Version Definitions:

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

PACKAGE MATERIALS INFORMATION

www.ti.com 25-Aug-2025

TAPE AND REEL INFORMATION





A0	Dimension designed to accommodate the component width
В0	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		SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
CD74AC299M96	SOIC	DW	20	2000	330.0	24.4	10.8	13.3	2.7	12.0	24.0	Q1
CD74ACT299M96	SOIC	DW	20	2000	330.0	24.4	10.8	13.3	2.7	12.0	24.0	Q1

www.ti.com 25-Aug-2025



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
CD74AC299M96	SOIC	DW	20	2000	356.0	356.0	45.0
CD74ACT299M96	SOIC	DW	20	2000	356.0	356.0	45.0

PACKAGE MATERIALS INFORMATION

www.ti.com 25-Aug-2025

TUBE



*All dimensions are nominal

Device	Package Name	Package Type	Pins	SPQ	L (mm)	W (mm)	T (µm)	B (mm)
CD74AC323M	DW	SOIC	20	25	507	12.83	5080	6.6
CD74AC323M.A	DW	SOIC	20	25	507	12.83	5080	6.6

14 LEADS SHOWN



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.



SOIC



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-013.



SOIC



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.



SOIC



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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