

具有快速进位的高速 CMOS 逻辑 4 位二进制全加器

1 特性

- 添加两个二进制数
- 全面的内部前瞻
- 用于经济型扩展的快速纹波进位
- 在正负逻辑下运行
- 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°C 至 125°C
- 平衡的传播延迟及转换时间
- 与 LSTTL 逻辑 IC 相比, 功耗显著降低
- HC 类型
 - 工作电压为 2V 至 6V
 - 高抗噪性: 当 $V_{CC} = 5V$ 时, $N_{IL} = 30%$, $N_{IH} = V_{CC}$ 的 30%
- HCT 类型
 - 工作电压为 4.5V 至 5.5V
 - 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, 在 V_{OL} 、 V_{OH} 下 $I_I \leq 1\mu A$

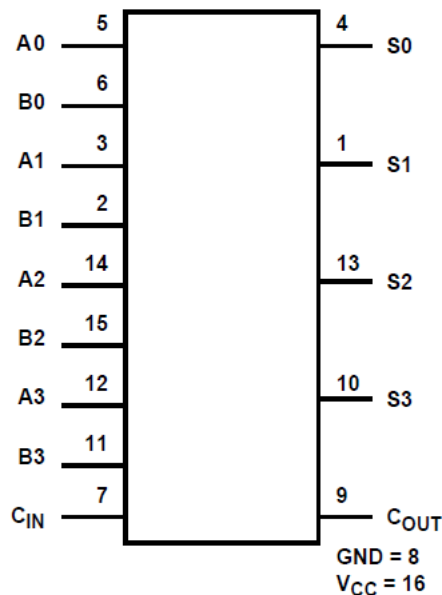
2 说明

CDx4HC283 和 CDx4HCT283 包含 4 位二进制加法器。HCT 器件具有 TTL 电压兼容输入。

器件信息

器件型号	封装 ⁽¹⁾	封装尺寸 (标称值)
CD54HC283	J (CDIP、16)	24.38mm × 6.92mm
CD74HC283CD74HC283	D (SOIC、16)	9.90mm × 3.90mm
	N (PDIP、16)	19.31mm × 6.35mm
CD74HCT283CD74HCT283	D (SOIC、16)	9.90mm × 3.90mm
	N (PDIP、16)	19.31mm × 6.35mm

(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。



功能图



Table of Contents

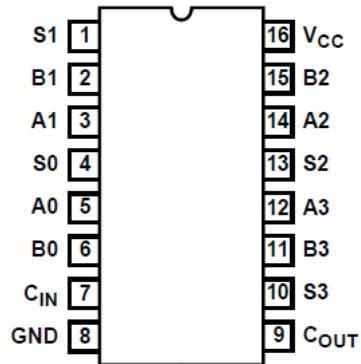
1 特性	1	7.2 Functional Block Diagram.....	9
2 说明	1	7.3 Feature Description.....	9
3 Revision History	2	8 Power Supply Recommendations	10
4 Pin Configuration and Functions	3	9 Layout	10
5 Specifications	4	9.1 Layout Guidelines.....	10
5.1 Absolute Maximum Ratings ⁽¹⁾	4	10 Device and Documentation Support	11
5.2 Recommended Operating Conditions	4	10.1 接收文档更新通知.....	11
5.3 Thermal Information.....	4	10.2 支持资源.....	11
5.4 Electrical Characteristics.....	5	10.3 Trademarks.....	11
5.5 Switching Characteristics	6	10.4 Electrostatic Discharge Caution.....	11
6 Parameter Measurement Information	8	10.5 术语表.....	11
7 Detailed Description	9	11 Mechanical, Packaging, and Orderable Information	11
7.1 Overview.....	9		

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 D (October 2003) to Revision E (July 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, or D package
16-Pin CDIP, PDIP, or SOIC
Top View

5 Specifications

5.1 Absolute Maximum Ratings⁽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
I _O	Drain current, per output	For - 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 range		- 65	150	°C
	Lead temperature (Soldering 10s)(SOIC - lead tips only)			300	°C

- (1) Stresses above those listed in “Absolute Maximum Ratings” may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied.

5.2 Recommended Operating Conditions

			MIN	MAX	UNIT
V _{CC}	Supply voltage range	HC types	2	6	V
V _I , V _O	DC input or output voltage		0	V _{CC}	V
	Input rise and fall time	2 V		1000	ns
		4.5 V		500	
		6 V		400	
T _A	Temperature range		- 55	125	V

5.3 Thermal Information

THERMAL METRIC		D (SOIC)	N (PDIP)	UNIT
		16 PINS	16 PINS	
R _{θJA}	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°C			- 40°C to 85°C		- 55°C to 125°C		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			
			6	4.2		4.2		4.2			
V _{IL}	Low level input voltage		2	0.5		0.5		0.5		V	
			4.5	1.35		1.35		1.35			
			6	1.8		1.8		1.8			
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			
		I _{OH} = - 20 μA	6	5.9		5.9		5.9			
		I _{OH} = - 4 mA	4.5	3.98		3.84		3.7		V	
		I _{OH} = - 5.2 mA	6	6		5.34		5.2			
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			
		I _{OL} = 20 μA	6	0.1		0.1		0.1			
		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			
I _I	Input leakage current	V _{CC} or GND	6	±0.1		±1		±1		μA	
I _{CC}	Supply current	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	
V _{OH}		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	
V _{OL}		I _{OL} = 4 mA	4.5	0.26		0.33		0.4		V	
I _I	Input leakage current	V _{CC} to GND	5.5	±0.1		±1		±1		μA	
I _{CC}	Supply current	V _{CC} or GND	5.5	8		80		160		μA	
Δ I _{CC} ⁽¹⁾	Additional supply current per input pin	C _{IN} input held at V _{CC} - 2.1	4.5 to 5.5	100 540		675		735		μA	
		B1, A1, A0 inputs held at V _{CC} - 2.1	4.5 to 5.5	100 360		450		490		μA	
		B0 input held at V _{CC} - 2.1	4.5 to 5.5	100 144		180		196		μA	
		B3, A3, A2, B2 inputs held at V _{CC} - 2.1	4.5 to 5.5	100 180		225		245		μA	

(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}, unless otherwise noted.

5.5 Switching Characteristics

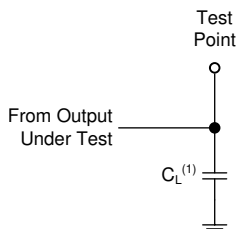
PARAMETER		TEST CONDITIONS	V _{CC} (V)	25°C			- 40 to 85°C		- 55°C to 125°C		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
HC TYPES											
t _{PLH} , t _{PHL}	Propagation delay C _{IN} to S0	C _L = 50 pF	2		160		200		240	ns	
			4.5		32		40		45		
		C _L = 15 pF	5		13						
		C _L = 50 pF	6		27		34		41		
t _{PLH} , t _{PHL}	C _{IN} to S1	C _L = 50 pF	2		180		225		270	ns	
			4.5		36		45		54		
		C _L = 15 pF	5		15						
t _{PLH} , t _{PHL}	C _{IN} to S2, C _{IN} to C _{OUT}	C _L = 50 pF	2		195		245		295	ns	
			4.5		39		49		59		
		C _L = 15 pF	5		16						
t _{PLH} , t _{PHL}	C _{IN} to S3	C _L = 50 pF	2		230		290		345	ns	
			4.5		46		58		69		
		C _L = 15 pF	5		19						
t _{PLH} , t _{PHL}	An, Bn to C _{OUT}	C _L = 50 pF	2		195		245		295	ns	
			4.5		39		49		59		
		C _L = 15 pF	5		16						
t _{PLH} , t _{PHL}	An, Bn to Sn	C _L = 50 pF	2		210		265		315	ns	
			4.5		42		53		63		
		C _L = 15 pF	5		18						
t _{PLH} , t _{PHL}	An, Bn to Sn	C _L = 50 pF	2		210		265		315	ns	
			4.5		42		53		63		
		C _L = 15 pF	5		18						
t _{TLH} , t _{THL}	Output transition time	C _L = 50 pF	2		75		95		110	ns	
			4.5		15		19		22		
			6		13		16		19		
C _{IN}	Input capacitance	C _L = 50 pF	-		10		10		10	pF	
C _{PD}	Power dissipation capacitance ^{(1) (2)}		5		70					pF	
HCT TYPES											
t _{PLH} , t _{PHL}	Propagation delay C _{IN} to S0	C _L = 15 pF	5		13					ns	
		C _L = 50 pF	4.5		31		39		47		
t _{PLH} , t _{PHL}	C _{IN} to S1	C _L = 15 pF	5		18					ns	
		C _L = 50 pF	4.5		43		54		65		
t _{PLH} , t _{PHL}	C _{IN} to S2, C _{IN} to C _{OUT}	C _L = 15 pF	5		19					ns	
		C _L = 50 pF	4.5		46		58		69		
t _{PLH} , t _{PHL}	C _{IN} to S3	C _L = 15 pF	5		22					ns	
		C _L = 50 pF	4.5		53		66		80		
t _{PLH} , t _{PHL}	An, Bn to C _{OUT}	C _L = 15 pF	5		20					ns	
		C _L = 50 pF	4.5		48		60		72		
t _{PLH} , t _{PHL}	An, Bn to Sn	C _L = 15 pF	5		21					ns	
		C _L = 50 pF	4.5		49		61		74		

5.5 Switching Characteristics (continued)

PARAMETER		TEST CONDITIONS	V _{CC} (V)	25°C			- 40 to 85°C		- 55°C to 125°C		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t _{TLH} , t _{THL}	Output transition time	C _L = 50 pF	4.5			15		19		22	ns
C _{IN}	Input capacitance					10		10		10	pF
C _{PD}	Power dissipation capacitance ^{(1) (2)}		5		82						pF

- (1) C_{PD} is used to determine the dynamic power consumption, per package.
 (2) $P_D = V_{CC}^2 f_i (C_{PD} + C_L)$ where: f_i = Input Frequency, C_L = Output Load Capacitance, V_{CC} = Supply Voltage.

6 Parameter Measurement Information



1. Includes probe and test-fixture capacitance.

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

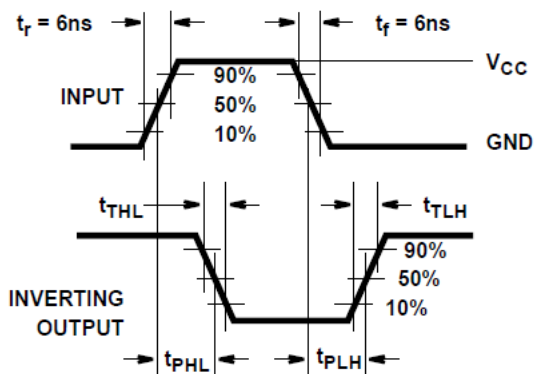


图 6-2. HC and HCT Transition Times and Propagation Delay Times, Combination Logic

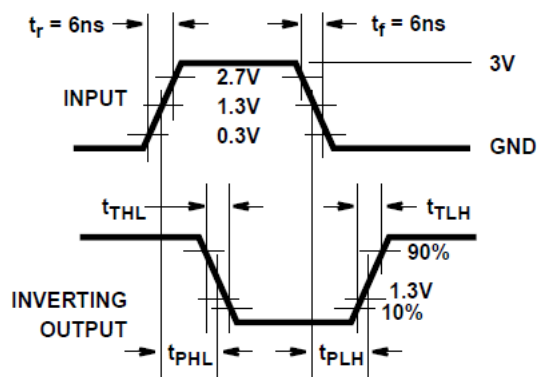


图 6-3. HCT Transition Times and Propagation Delay Times, Combination Logic

1. The greater between t_r and t_f is the same as t_t .
2. The greater between t_{plh} and t_{phi} is the same as t_{pd} .

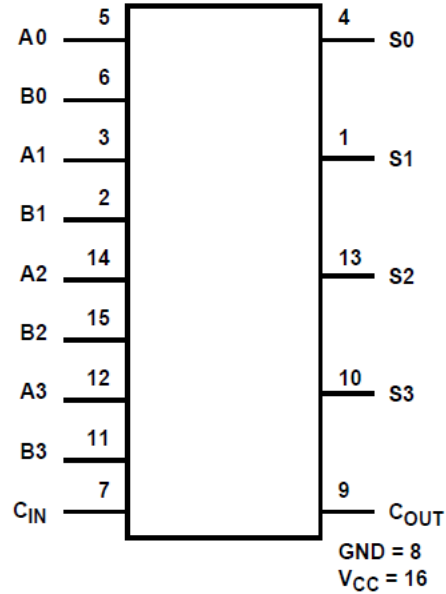
7 Detailed Description

7.1 Overview

The ' HC283 and ' HCT283 binary full adders add two 4-bit binary numbers and generate a carry-out bit if the sum exceeds 15.

Because of the symmetry of the add function, this device can be used with either all active-high operands (positive logic) or with all active-low operands (negative logic). When using positive logic the carry-in input must be tied low if there is no carry-in.

7.2 Functional Block Diagram



7.3 Feature Description

- Balanced CMOS Push-Pull Outputs
- Clamp Diode Structure

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- μ F capacitor is recommended for this device. It is acceptable to parallel multiple bypass caps to reject different frequencies of noise. The 0.1- μ F and 1- μ 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 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。

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》](#)。

10.3 Trademarks

TI E2E™ is a trademark of Texas Instruments.
所有商标均为其各自所有者的财产。

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.

PACKAGING INFORMATION

Orderable part number	Status (1)	Material type (2)	Package Pins	Package qty Carrier	RoHS (3)	Lead finish/ Ball material (4)	MSL rating/ Peak reflow (5)	Op temp (°C)	Part marking (6)
5962-8976501EA	Active	Production	CDIP (J) 16	25 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962-8976501EA CD54HC283F3A
CD54HC283F3A	Active	Production	CDIP (J) 16	25 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962-8976501EA CD54HC283F3A
CD54HC283F3A.A	Active	Production	CDIP (J) 16	25 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962-8976501EA CD54HC283F3A
CD54HCT283F3A	Active	Production	CDIP (J) 16	25 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	CD54HCT283F3A
CD54HCT283F3A.A	Active	Production	CDIP (J) 16	25 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	CD54HCT283F3A
CD74HC283E	Active	Production	PDIP (N) 16	25 TUBE	Yes	NIPDAU	N/A for Pkg Type	-55 to 125	CD74HC283E
CD74HC283E.A	Active	Production	PDIP (N) 16	25 TUBE	Yes	NIPDAU	N/A for Pkg Type	-55 to 125	CD74HC283E
CD74HC283M96	Active	Production	SOIC (D) 16	2500 LARGE T&R	Yes	NIPDAU SN	Level-1-260C-UNLIM	-55 to 125	HC283M
CD74HC283M96.A	Active	Production	SOIC (D) 16	2500 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-55 to 125	HC283M
CD74HC283M96G4	Active	Production	SOIC (D) 16	2500 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-55 to 125	HC283M
CD74HC283M96G4.A	Active	Production	SOIC (D) 16	2500 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-55 to 125	HC283M
CD74HCT283E	NRND	Production	PDIP (N) 16	25 TUBE	Yes	NIPDAU	N/A for Pkg Type	-55 to 125	CD74HCT283E
CD74HCT283E.A	NRND	Production	PDIP (N) 16	25 TUBE	Yes	NIPDAU	N/A for Pkg Type	-55 to 125	CD74HCT283E
CD74HCT283M	Obsolete	Production	SOIC (D) 16	-	-	Call TI	Call TI	-55 to 125	HCT283M
CD74HCT283M96	Active	Production	SOIC (D) 16	2500 LARGE T&R	Yes	NIPDAU SN	Level-1-260C-UNLIM	-55 to 125	HCT283M
CD74HCT283M96.A	Active	Production	SOIC (D) 16	2500 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-55 to 125	HCT283M
CD74HCT283M961G4	Active	Production	SOIC (D) 16	2500 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-55 to 125	HCT283M
CD74HCT283M961G4.A	Active	Production	SOIC (D) 16	2500 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-55 to 125	HCT283M
CD74HCT283MT	Obsolete	Production	SOIC (D) 16	-	-	Call TI	Call TI	-55 to 125	HCT283M

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

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

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

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

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

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

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

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

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

OTHER QUALIFIED VERSIONS OF CD54HC283, CD54HCT283, CD74HC283, CD74HCT283 :

- Catalog : [CD74HC283](#), [CD74HCT283](#)
- Military : [CD54HC283](#), [CD54HCT283](#)

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
CD74HCT283M96	SOIC	D	16	2500	330.0	16.4	6.5	10.3	2.1	8.0	16.0	Q1
CD74HCT283M96	SOIC	D	16	2500	330.0	16.4	6.6	9.3	2.1	8.0	16.0	Q1
CD74HCT283M961G4	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)
CD74HCT283M96	SOIC	D	16	2500	353.0	353.0	32.0
CD74HCT283M96	SOIC	D	16	2500	366.0	364.0	50.0
CD74HCT283M961G4	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)
CD74HC283E	N	PDIP	16	25	506	13.97	11230	4.32
CD74HC283E	N	PDIP	16	25	506	13.97	11230	4.32
CD74HC283E.A	N	PDIP	16	25	506	13.97	11230	4.32
CD74HC283E.A	N	PDIP	16	25	506	13.97	11230	4.32
CD74HCT283E	N	PDIP	16	25	506	13.97	11230	4.32
CD74HCT283E	N	PDIP	16	25	506	13.97	11230	4.32
CD74HCT283E.A	N	PDIP	16	25	506	13.97	11230	4.32
CD74HCT283E.A	N	PDIP	16	25	506	13.97	11230	4.32

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.

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.

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