

SNx4AHCT374 具有三态输出的八路边沿触发式 D 型触发器

1 特性

- 输入兼容 TTL 电压
- 闩锁性能超过 250mA，符合 JESD 17 规范

2 应用

- 可编程逻辑控制器 (PLC)
- DCS 和 PAC：模拟输入模块
- 火车、有轨电车和地铁车厢
- 交流逆变器驱动器
- 打印机

3 说明

'AHCT374 器件是八路边沿触发式 D 类触发器，具有专门设计用于驱动高容性或较低阻抗负载的三态输出。该器件尤其适用于实现缓冲寄存器、I/O 端口、双向总线驱动器和工作寄存器。

在时钟 (CLK) 输入发生正向转换时，Q 输出被设置为数据 (D) 输入的逻辑电平。

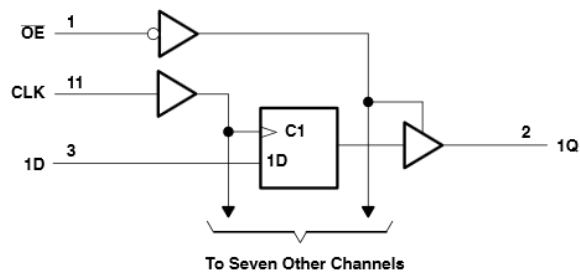
器件信息

器件型号	封装 ⁽¹⁾	封装尺寸 ⁽²⁾	本体尺寸 ⁽³⁾
SNx4AHCT374	DB (SSOP, 20)	7.2mm × 7.8mm	7.50mm × 5.30mm
	DW (SOIC, 20)	12.80mm × 10.3mm	12.8mm × 7.5mm
	N (PDIP, 20)	24.33mm × 9.4mm	25.40mm × 6.35mm
	PW (TSSOP, 20)	6.50mm × 6.4mm	6.50mm × 4.40mm
	J (CDIP, 20)	24.2mm × 7.62mm	24.2mm × 6.92mm
	W (CFP, 20)	13.09mm × 8.13mm	13.09mm × 6.92mm
	FK (LCCC, 20)	8.89mm × 8.89mm	8.89mm × 8.89mm

(1) 有关更多信息，请参阅节 11。

(2) 封装尺寸 (长 × 宽) 为标称值，并包括引脚 (如适用)。

(3) 本体尺寸 (长 × 宽) 为标称值，不包括引脚。



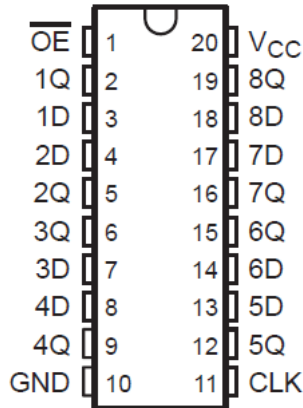
逻辑图 (正逻辑)



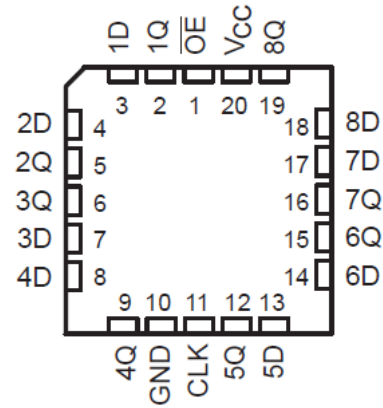
Table of Contents

1 特性	1	7.1 Overview.....	8
2 应用	1	7.2 Functional Block Diagram.....	8
3 说明	1	7.3 Device Functional Modes.....	8
4 Pin Configuration and Functions	3	8 Application and Implementation	9
5 Specifications	4	8.1 Power Supply Recommendations.....	9
5.1 Absolute Maximum Ratings.....	4	8.2 Layout.....	9
5.2 ESD Ratings.....	4	9 Device and Documentation Support	10
5.3 Recommended Operating Conditions.....	4	9.1 Documentation Support.....	10
5.4 Thermal Information.....	4	9.2 接收文档更新通知.....	10
5.5 Electrical Characteristics.....	5	9.3 支持资源.....	10
5.6 Timing Requirements.....	5	9.4 Trademarks.....	10
5.7 Switching Characteristics.....	5	9.5 静电放电警告.....	10
5.8 Noise Characteristics.....	6	9.6 术语表.....	10
5.9 Operating Characteristics.....	6	10 Revision History	10
6 Parameter Measurement Information	7	11 Mechanical, Packaging, and Orderable Information	11
7 Detailed Description	8		

4 Pin Configuration and Functions



J, DB, DW, N, NS, or PW Package
20-Pin CDIP, SSOP, SOIC, PDIP, SO, or TSSOP
(Top View)



FK Package
20-Pin LCCC
(Top View)

表 4-1. Pin Functions

PIN		TYPE	DESCRIPTION
NAME	NO.		
OE	1	I	Enable pin
1Q	2	O	Output 1
1D	3	I	Input 1
2D	4	I	Input 2
2Q	5	O	Output 2
3Q	6	O	Output 3
3D	7	I	Input 3
4D	8	I	Input 4
4Q	9	O	Output 4
GND	10	-	Ground pin
CLK	11	I	Clock pin
5Q	12	O	Output 5
5D	13	I	Input 5
6D	14	I	Input 6
6Q	15	O	Output 6
7Q	16	O	Output 7
7D	17	I	Input 7
8D	18	I	Input 8
8Q	19	O	Output 8
V _{CC}	20	-	Power pin

5 Specifications

5.1 Absolute Maximum Ratings

over operating free-air temperature range (unless otherwise noted)#none#

		MIN	MAX	UNIT
V_{CC}	Supply voltage	-0.5	7	V
V_I	Input voltage ²	-0.5	7	V
V_O	Output voltage ²	-0.5	$V_{CC} + 0.5$	V
I_{IK}	Input clamp current	$(V_I < 0)$		-20 mA
I_{OK}	Output clamp current	$(V_O < 0 \text{ or } V_O > V_{CC})$		± 20 mA
I_O	Continuous output current	$(V_O = 0 \text{ to } V_{CC})$		± 25 mA
	Continuous current through V_{CC} or GND			± 75 mA
T_{stg}	Storage temperature	-65	150	°C

(1) The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

5.2 ESD Ratings

		VALUE	UNIT
$V_{(ESD)}$	Electrostatic discharge	Human-Body Model (A114-A) ⁽¹⁾	± 2000
		Charged-device model (CDM), per JEDEC specification JESD22-C101 ⁽²⁾	± 1000
		Machine Model (A115-A)	± 200

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

(2) JEDEC document JEP157 states that 250-V CDM allows safe manufacturing with a standard ESD control process.

5.3 Recommended Operating Conditions

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

		SN54AHCT374		SN74AHCT374		UNIT
		MIN	MAX	MIN	MAX	
V_{CC}	Supply voltage	4.5	5.5	4.5	5.5	V
V_{IH}	High-level input voltage	$V_{CC} = 2 \text{ V}$		2		V
V_{IL}	Low-level input voltage	$V_{CC} = 2 \text{ V}$			0.8	V
V_I	Input voltage	0	5.5	0	5.5	V
V_O	Output voltage	High or low state		0	V_{CC}	V
I_{OH}	High-level output current	$V_{CC} = 2 \text{ V}$			-8	mA
I_{OL}	Low-level output current	$V_{CC} = 2 \text{ V}$			8	mA
$\Delta t / \Delta v$	Input transition rise or fall rate	$V_{CC} = 2.3 \text{ V to } 2.7 \text{ V}$			20	ns/V
T_A	Operating free-air temperature	-55	125	-40	85	°C

(1) All unused inputs of the device must be held at V_{CC} or GND to ensure proper device operation. See [Implications of Slow or Floating CMOS Inputs](#), SCBA004.

5.4 Thermal Information

THERMAL METRIC ⁽¹⁾		SN74AHCT374				UNIT
		DB (SSOP)	DW (SOIC)	N (PDIP)	PW (TSSOP)	
		20 PINS	20 PINS	20 PINS	20 PINS	
$R_{\theta JA}$	Junction-to-ambient thermal resistance	70	58	69	116.8	°C/W

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

5.5 Electrical Characteristics

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

PARAMETER	TEST CONDITIONS	V _{CC}	T _A = 25°C			SN54AHCT374		SN74AHCT374		UNIT
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
V _{OH}	I _{OH} = -50 μA	4.5 V	4.4	4.5		4.4		4.4	V	
	I _{OH} = -8 mA		3.94			3.8		3.8		
V _{OL}	I _{OL} = 50 μA	4.5 V			0.1			0.1	V	
	I _{OL} = 8 mA				0.36		0.44	0.44		
I _I	V _I = 5.5 V or GND	0 V to 5.5 V			±0.1		±1	±1	μA	
I _{OZ}	V _O = V _{CC} or GND, V _I = V _{IH} or V _{IL}	5.5 V			±0.25		±2.5	±2.5	μA	
I _{CC}	V _I = V _{CC} or GND, I _O = 0	5.5 V			4		40	40	μA	
ΔI _{CAC} †	One input at 3.4 V, Other inputs at V _{CC} or GND	5.5 V			1.35		1.5	1.5	mA	
C _i	V _I = V _{CC} or GND	5 V		4	10			10	pF	
C _o	V _O = V _{CC} or GND	5 V		9					pF	

5.6 Timing Requirements

over recommended operating free-air temperature range, V_{CC} = 5 V ± 0.5 V (unless otherwise noted) (see [Load Circuit and Voltage Waveforms](#))

PARAMETER	DESCRIPTION	T _A = 25°C		SN54AHCT373		SN74AHCT373		UNIT
		MIN	MAX	MIN	MAX	MIN	MAX	
t _w	Pulse duration, CLK high or low	6.5		6.5		6.5		ns
t _{su}	Setup time, data before CLK ↑	2.5		2.5		2.5		ns
t _h	Hold time, data after CLK ↑	2.5		2.5		2.5		ns

5.7 Switching Characteristics

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

PARAMETER	FROM (INPUT)	TO (OUTPUT)	LOAD CAPACITANCE	T _A = 25°C			SN54AHCT374		SN74AHCT374		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
f _{max}			C _L = 15 pF	90 ¹	140 ¹		80 ¹		80	MHz	
			C _L = 50 pF	85	130		75		75		
t _{PLH}	CLK	Q	C _L = 15 pF		5.6 ¹	9.4 ¹	1 ¹	10.5 ¹	1	10.5	ns
t _{PHL}					5.6 ¹	9.4 ¹	1 ¹	10.5 ¹	1	10.5	
t _{PZH}	OE	Q	C _L = 15 pF		6.5 ¹	10.2 ¹	1 ¹	11.5 ¹	1	11.5	
t _{PZL}					6.5 ¹	10.2 ¹	1 ¹	11.5 ¹	1	11.5	
t _{PHZ}	OE	Q	C _L = 15 pF		6.2 ¹	10.2 ¹	1 ¹	11 ¹	1	11	ns
t _{PLZ}					6.2 ¹	10.2	1 ¹	11 ¹	1	11	
t _{PLH}	CLK	Q	C _L = 50 pF		6.4	10.4	1	11.5	1	11.5	
t _{PHL}					6.4	10.4	1	11.5	1	11.5	
t _{PZH}	OE	Q	C _L = 50 pF		7.3	11.2	1	12.5	1	12.5	ns
t _{PZL}					7.3	11.2	1	12.5	1	12.5	
t _{PHZ}	OE	Q	C _L = 50 pF		7	11.2	1	12	1	12	
t _{PLZ}					7	11.2	1	12	1	12	
t _{sk(o)}			C _L = 50 pF			1 ²					

(1) On products compliant to MIL-PRF-38535, this parameter is not production tested.

5.8 Noise Characteristics

$V_{CC} = 5\text{ V}$, $C_L = 50\text{ pF}$, $T_A = 25^\circ\text{C}$ (1)

PARAMETER	SNx4AHCT374			UNIT
	MIN	TYP	MAX	
$V_{OL(P)}$ Quiet output, maximum dynamic V_{OL}		0.8	1.2	V
$V_{OL(V)}$ Quiet output, minimum dynamic V_{OL}		-0.8	-1.2	V
$V_{OH(V)}$ Quiet output, minimum dynamic V_{OH}	3.8			V
$V_{IH(D)}$ High-level dynamic input voltage	2			V
$V_{IL(D)}$ Low-level dynamic input voltage			0.8	V

(1) Characteristics are for surface-mount packages only.

5.9 Operating Characteristics

$T_A = 25^\circ\text{C}$

PARAMETER	TEST CONDITIONS	TYP	UNIT
C_{pd} Power dissipation capacitance	No load, $f = 1\text{ MHz}$	27	pF

6 Parameter Measurement Information

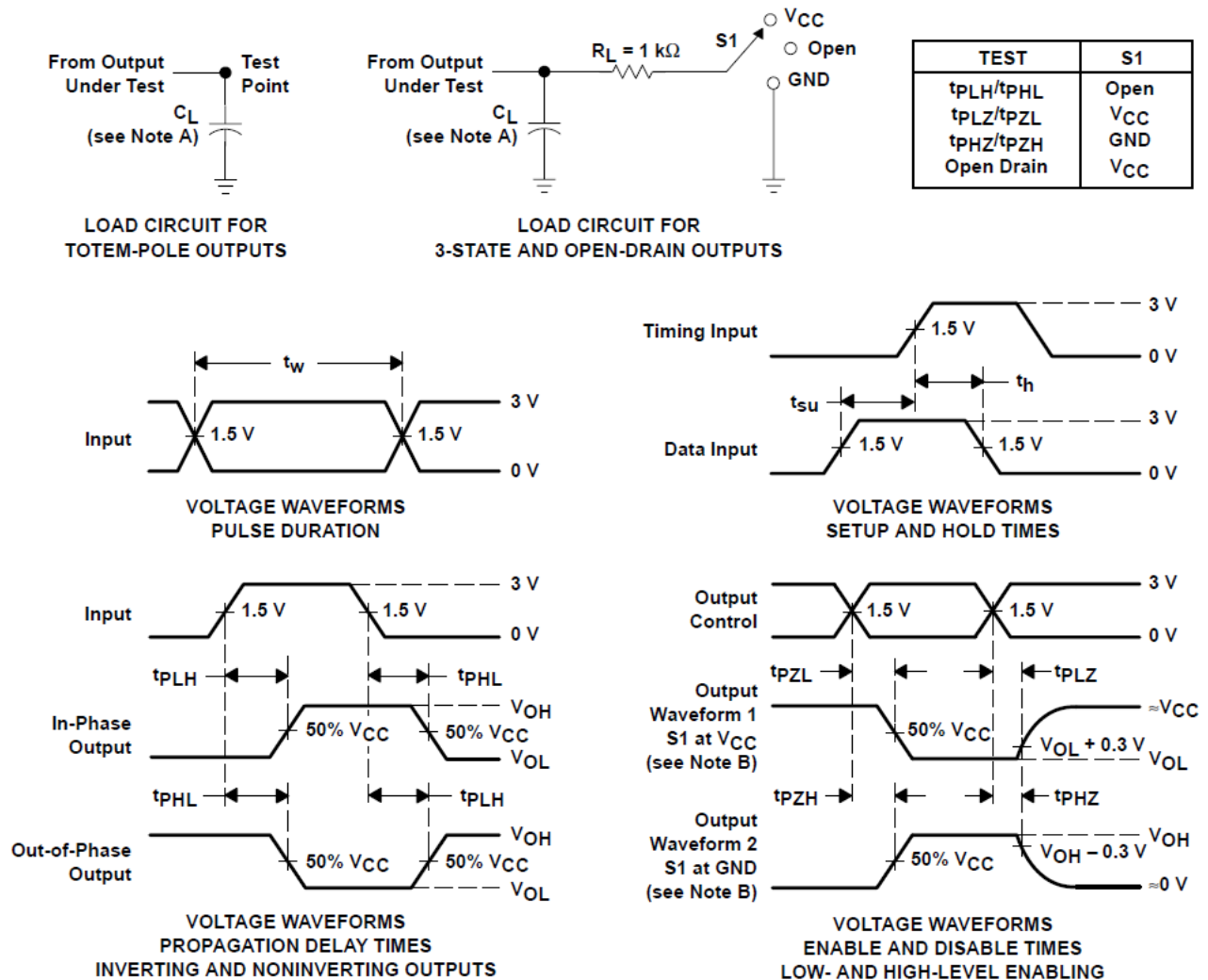


图 6-1. Load Circuit and Voltage Waveforms

A. C_L includes probe and jig 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: $PRR \leq 1\text{ MHz}$, $Z_O = 50\ \Omega$, $t_r \leq 3\text{ ns}$, $t_f \leq 3\text{ ns}$.

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

E. All parameters and waveforms are not applicable to all devices.

7 Detailed Description

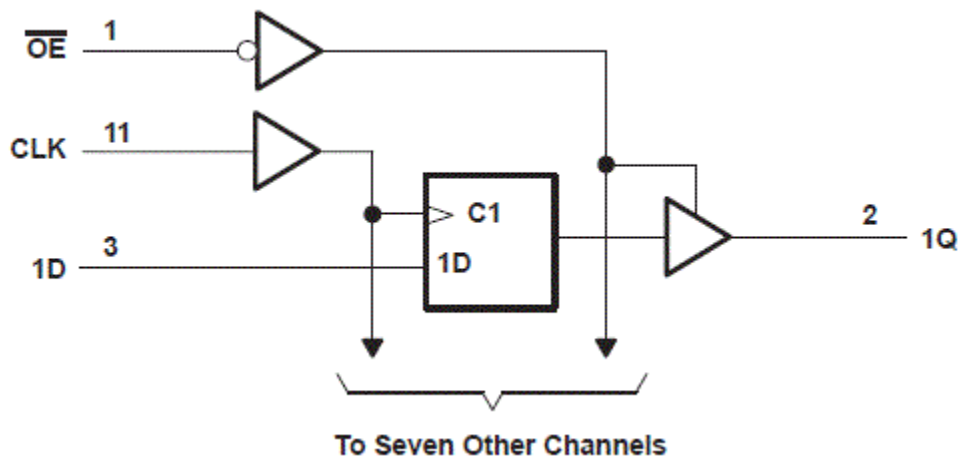
7.1 Overview

A buffered output-enable (\overline{OE}) input can be used to place the eight outputs in either a normal logic state (high or low logic levels) or the high-impedance state. In the high-impedance state, the outputs neither load nor drive the bus lines significantly. The high-impedance state and the increased drive provide the capability to drive bus lines without interface or pullup components.

\overline{OE} does not affect internal operations of the flip-flop. Old data can be retained or new data can be entered while the outputs are in the high-impedance state.

To ensure the high-impedance state during power up or power down, \overline{OE} should be tied to V_{CC} through a pullup resistor; the minimum value of the resistor is determined by the current-sinking capability of the driver.

7.2 Functional Block Diagram



7.3 Device Functional Modes

表 7-1. Function Table
(Each Flip-Flop)

INPUTS			OUTPUT
OE	CLK	D	Q
L	↑	H	H
L	↑	L	L
L	H or L	X	Q_0
H	X	X	Z

8 Application and Implementation

备注

以下应用部分中的信息不属于 TI 器件规格的范围，TI 不担保其准确性和完整性。TI 的客户应负责确定器件是否适用于其应用。客户应验证并测试其设计，以确保系统功能。

8.1 Power Supply Recommendations

The power supply can be any voltage between the MIN and MAX supply voltage rating located in the [表 5.3](#) table.

Each V_{CC} pin should have a good bypass capacitor to prevent power disturbance. For devices with a single supply, $0.1 \mu F$ is recommended. If there are multiple V_{CC} pins, $0.01 \mu F$ or $0.022 \mu F$ is recommended for each power pin. It is acceptable to parallel multiple bypass caps to reject different frequencies of noise. A $0.1 \mu F$ and $1 \mu F$ are commonly used in parallel. The bypass capacitor should be installed as close to the power pin 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 three of the four 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. Floating outputs is generally acceptable, 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 will not disable the input section of the I.O's so they also cannot float when disabled.

8.2.1.1 Layout Example

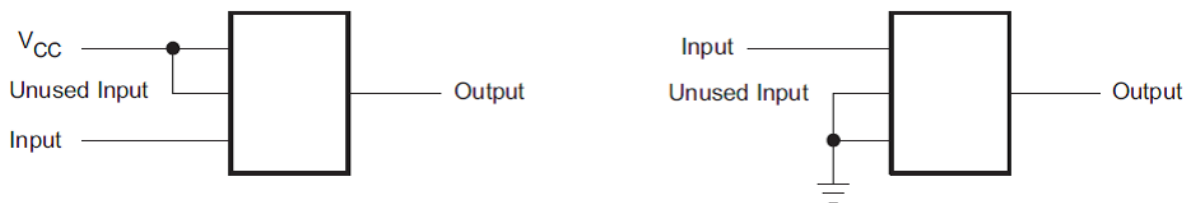


图 8-1. Layout Example

9 Device and Documentation Support

9.1 Documentation Support

9.1.1 Related Documentation

For related documentation see the following:

[Implications of Slow or Floating CMOS Inputs](#), SCBA004

9.2 接收文档更新通知

要接收文档更新通知，请导航至 [ti.com](https://www.ti.com) 上的器件产品文件夹。点击 [通知](#) 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。

9.3 支持资源

[TI E2E™ 中文支持论坛](#) 是工程师的重要参考资料，可直接从专家处获得快速、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，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](#)。

9.4 Trademarks

TI E2E™ is a trademark of Texas Instruments.

所有商标均为其各自所有者的财产。

9.5 静电放电警告



静电放电 (ESD) 会损坏这个集成电路。德州仪器 (TI) 建议通过适当的预防措施处理所有集成电路。如果不遵守正确的处理和安装程序，可能会损坏集成电路。

ESD 的损坏小至导致微小的性能降级，大至整个器件故障。精密的集成电路可能更容易受到损坏，这是因为非常细微的参数更改都可能会导致器件与其发布的规格不相符。

9.6 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。

10 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 M (April 2023) to Revision N (August 2024) Page

- | | |
|--|---|
| • 向 器件信息 表中添加了封装尺寸..... | 1 |
| • Updated R _θ JA values: PW = 83 to 116.8, all values in °C/W | 4 |

Changes from Revision L (July 2003) to Revision M (April 2023) Page

- | | |
|---|---|
| • 添加了 应用 、 封装信息表 、 引脚功能表 、 ESD 等级表 、 热性能信息表 、 器件功能模式 、 应用和实施 部分、 电源相关建议 部分、 布局 部分、 器件和文档支持 部分以及 机械 、 封装和可订购信息 部分..... | 1 |
|---|---|

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
5962-9686501Q2A	ACTIVE	LCCC	FK	20	55	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	5962- 9686501Q2A SNJ54AHCT 374FK	Samples
5962-9686501QRA	ACTIVE	CDIP	J	20	20	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	5962-9686501QR A SNJ54AHCT374J	Samples
5962-9686501QSA	ACTIVE	CFP	W	20	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	5962-9686501QS A SNJ54AHCT374W	Samples
SN74AHCT374DBR	ACTIVE	SSOP	DB	20	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 85	HB374	Samples
SN74AHCT374DW	OBSOLETE	SOIC	DW	20		TBD	Call TI	Call TI	-40 to 85	AHCT374	
SN74AHCT374DWR	ACTIVE	SOIC	DW	20	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 85	AHCT374	Samples
SN74AHCT374N	ACTIVE	PDIP	N	20	20	RoHS & Green	NIPDAU	N / A for Pkg Type	-40 to 85	SN74AHCT374N	Samples
SN74AHCT374PW	OBSOLETE	TSSOP	PW	20		TBD	Call TI	Call TI	-40 to 85	HB374	
SN74AHCT374PWR	ACTIVE	TSSOP	PW	20	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 85	HB374	Samples
SNJ54AHCT374FK	ACTIVE	LCCC	FK	20	55	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	5962- 9686501Q2A SNJ54AHCT 374FK	Samples
SNJ54AHCT374J	ACTIVE	CDIP	J	20	20	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	5962-9686501QR A SNJ54AHCT374J	Samples
SNJ54AHCT374W	ACTIVE	CFP	W	20	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	5962-9686501QS A SNJ54AHCT374W	Samples

(1) The marketing status values are defined as follows:

ACTIVE: Product device recommended for new designs.

LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

PREVIEW: Device has been announced but is not in production. Samples may or may not be available.

OBSOLETE: TI has discontinued the production of the device.

(2) **RoHS:** TI defines "RoHS" to mean semiconductor products that are compliant with the current EU RoHS requirements for all 10 RoHS substances, including the requirement that RoHS substance do not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, "RoHS" products are suitable for use in specified lead-free processes. TI may reference these types of products as "Pb-Free".

RoHS Exempt: TI defines "RoHS Exempt" to mean products that contain lead but are compliant with EU RoHS pursuant to a specific EU RoHS exemption.

Green: TI defines "Green" to mean the content of Chlorine (Cl) and Bromine (Br) based flame retardants meet JS709B low halogen requirements of ≤ 1000 ppm threshold. Antimony trioxide based flame retardants must also meet the ≤ 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.

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 SN54AHCT374, SN74AHCT374 :

● Catalog : [SN74AHCT374](#)

● Military : [SN54AHCT374](#)

NOTE: Qualified Version Definitions:

● Catalog - TI's standard catalog product

● Military - QML certified for Military and Defense Applications

重要声明和免责声明

TI“按原样”提供技术和可靠性数据（包括数据表）、设计资源（包括参考设计）、应用或其他设计建议、网络工具、安全信息和其他资源，不保证没有瑕疵且不做任何明示或暗示的担保，包括但不限于对适销性、某特定用途方面的适用性或不侵犯任何第三方知识产权的暗示担保。

这些资源可供使用 TI 产品进行设计的熟练开发人员使用。您将自行承担以下全部责任：(1) 针对您的应用选择合适的 TI 产品，(2) 设计、验证并测试您的应用，(3) 确保您的应用满足相应标准以及任何其他功能安全、信息安全、监管或其他要求。

这些资源如有变更，恕不另行通知。TI 授权您仅可将这些资源用于研发本资源所述的 TI 产品的应用。严禁对这些资源进行其他复制或展示。您无权使用任何其他 TI 知识产权或任何第三方知识产权。您应全额赔偿因在这些资源的使用中对 TI 及其代表造成的任何索赔、损害、成本、损失和债务，TI 对此概不负责。

TI 提供的产品受 [TI 的销售条款](#) 或 [ti.com](#) 上其他适用条款/TI 产品随附的其他适用条款的约束。TI 提供这些资源并不会扩展或以其他方式更改 TI 针对 TI 产品发布的适用的担保或担保免责声明。

TI 反对并拒绝您可能提出的任何其他或不同的条款。

邮寄地址：Texas Instruments, Post Office Box 655303, Dallas, Texas 75265

Copyright © 2024，德州仪器 (TI) 公司