

SNx4AHC594 具有输出寄存器的 8 位移位寄存器

1 特性

- 工作范围为 2V 至 5.5V V_{CC}
- 具有存储功能的 8 位串行输入、并行输出移位寄存器
- 移位寄存器和存储寄存器上的独立直接覆盖清零
- 移位寄存器和存储寄存器的独立时钟
- 闩锁性能超过 100mA，符合 JESD 78 II 类规范
- ESD 保护性能超过 JESD 22 规范要求
 - 2000V 人体放电模型 (A114-A)
 - 1000V 充电器件模型 (C101)

2 应用

- 网络交换机
- 电力基础设施
- PC 和笔记本电脑
- LED 显示屏
- 服务器

3 说明

SNx4AHC594 器件包含一个可对 8 位 D 类存储寄存器进行馈送的 8 位串行输入、并行输出移位寄存器。移位寄存器和存储寄存器有单独的时钟和直接覆盖清零 (SRCLR、RCLR) 输入，以及用于级联用途的串行 (Q_H) 输出。

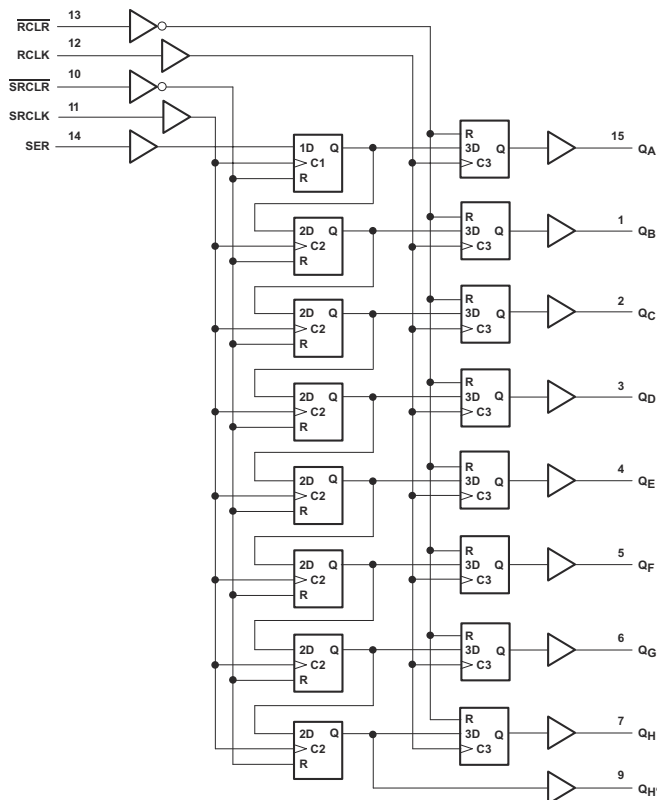
器件信息

器件型号	封装 ⁽¹⁾	封装尺寸 ⁽²⁾	本体尺寸 ⁽³⁾
SNx4AHC594	D (SOIC, 16)	9.90 mm x 6mm	9.90 mm x 3.90 mm
	DB (SSOP, 16)	6.20 mm x 7.8mm	6.20 mm x 5.30 mm
	N (PDIP, 16)	19.31 mm x 9.4mm	19.31 mm x 6.35 mm
	NS (SOP, 16)	5mm x 6.4mm	5mm x 4.4mm
	PW (TSSOP, 16)	5.00 mm x 6.4mm	5.00 mm x 4.40 mm

(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。



Pin numbers shown are for the D, DB, J, N, NS, PW, and W packages.

简化原理图

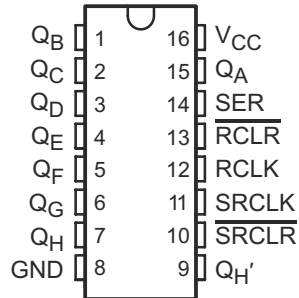


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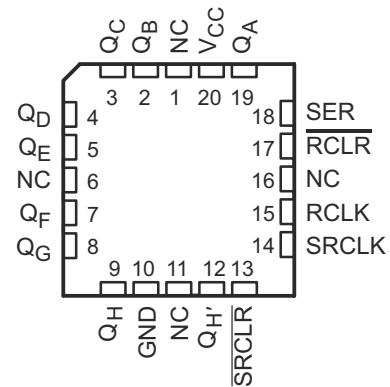
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4 Pin Configuration and Functions

SN54AHC594 . . . J OR W PACKAGE
SN74AHC594 . . . D, DB, N, NS, OR PW PACKAGE
(TOP VIEW)



SN54AHC594 . . . FK PACKAGE
(TOP VIEW)



NC - No internal connection

表 4-1. Pin Functions

Name	Pin			I/O	Description
	SN54AHC594		SN74AHC594		
	FK	J, W	D, DB, N, NS, PW		
GND	10	8	8	—	Ground Pin
NC	1	—	—	—	No connect
	6				
	11				
	16				
Q_A	19	15	15	O	Q_A Output
Q_B	2	1	1	O	Q_B Output
Q_C	3	2	2	O	Q_C Output
Q_D	4	3	3	O	Q_D Output
Q_E	5	4	4	O	Q_E Output
Q_F	7	5	5	O	Q_F Output
Q_G	8	6	6	O	Q_G Output
Q_H	9	7	7	O	Q_H Output
$Q_{H'}$	12	9	9	O	$Q_{H'}$ Output
RCLK	15	12	12	I	RCLK Input
RCLR	17	13	13	I	RCLR Input
SER	18	14	14	I	SER Input
SRCLK	14	11	11	I	SRCLK Input
SRCLR	13	10	10	I	SRCLR Input
V_{CC}	20	16	16	—	Power pin

5 Specifications

5.1 Absolute Maximum Ratings

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

		MIN	MAX	UNIT
V _{CC}	Supply voltage range	- 0.5	7	V
V _I	Input voltage range ⁽²⁾	- 0.5	7	V
V _O	Output voltage range ⁽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 or V _O > V _{CC}	±20	mA
I _O	Continuous output current	V _O = 0 to V _{CC}	±25	mA
	Continuous current through V _{CC} or GND		±75	mA
T _{stg}	Storage temperature range	- 65	150	

(1) Stresses beyond those listed under *Absolute Maximum Ratings* may cause permanent damage to the device. These are stress ratings only, which do not imply functional operation of the device at these or any other conditions beyond those indicated under *Recommended Operating Conditions*. 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 _(ESD)	Electrostatic discharge		
	Human body model (HBM), per ANSI/ESDA/JEDEC JS-001, all pins ⁽¹⁾	±2000	V
	Charged device model (CDM), per JEDEC specification JESD22-C101, all pins ⁽²⁾	±1000	

(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⁾

		SN54AHC594 ⁽²⁾		SN74AHC594		UNIT
		MIN	MAX	MIN	MAX	
V _{CC}	Supply voltage	2	5.5	2	5.5	V
V _{IH}	High-level input voltage	V _{CC} = 2 V	1.5	1.5		V
		V _{CC} = 3 V	2.1	2.1		
		V _{CC} = 5.5 V	3.85	3.85		
V _{IL}	Low-level input voltage	V _{CC} = 2 V		0.5	0.5	V
		V _{CC} = 3 V		0.9	0.9	
		V _{CC} = 5.5 V		1.65	1.65	
V _I	Input voltage	0	5.5	0	5.5	V
V _O	Output voltage	0	V _{CC}	0	V _{CC}	V
I _{OH}	High-level output current	V _{CC} = 2 V		- 50	- 50	µA
		V _{CC} = 3 V ± 0.3 V		- 4	- 4	mA
		V _{CC} = 5.5 V ± 0.5 V		- 8	- 8	
I _{OL}	Low-level output current	V _{CC} = 2 V		50	50	µA
		V _{CC} = 3 V ± 0.3 V		4	4	mA
		V _{CC} = 5.5 V ± 0.5 V		8	8	
Δt/Δv	Input transition rise and fall time	V _{CC} = 3 V ± 0.3 V		100	100	ns/V
		V _{CC} = 5.5 V ± 0.5 V		20	20	

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

		SN54AHC594 ⁽²⁾		SN74AHC594		UNIT
		MIN	MAX	MIN	MAX	
T _A	Operating free-air temperature	- 55	125	- 40	125	°C

- (1) All unused inputs of the device must be held at V_{CC} or GND to ensure proper device operation. Refer to the TI application report, *Implications of Slow or Floating CMOS Inputs*, (SCBA004).
 (2) Product Preview

5.4 Thermal Information

THERMAL METRIC ⁽¹⁾		SN74AHC594					UNIT
		D	DB	N	NS	PW	
		16 PINS					
R _{θJA}	Junction-to-ambient thermal resistance	80.2	97.5	47.5	79.1	135.9	°C/W
R _{θJC(top)}	Junction-to-case (top) thermal resistance	39.1	47.7	34.9	35.4	70.3	
R _{θJB}	Junction-to-board thermal resistance	27.7	48.1	27.5	39.9	81.3	
ψ _{JT}	Junction-to-top characterization parameter	9.9	9.8	19.8	5.4	22.5	
ψ _{JB}	Junction-to-board characterization parameter	37.4	47.6	27.4	39.5	80.8	
R _{θJC(bot)}	Junction-to-case (bottom) thermal resistance	n/a	n/a	n/a	n/a	n/a	

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

5.5 Electrical Characteristics

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

PARAMETER	TEST CONDITIONS	V _{CC}	T _A = 25°C			SN54AHC594 ⁽²⁾		SN74AHC594		UNIT
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
V _{OH}	I _{OH} = - 50 μA	2 V	1.9	2		1.9		1.9	V	
		3 V	2.9	3		2.9		2.9		
		4.5 V	4.4	4.5		4.4		4.4		
	I _{OH} = - 4 mA	3 V	2.58			2.48		2.48		
	I _{OH} = - 8 mA	4.5 V	3.94			3.8		3.8		
	Q _A - Q _H I _{OH} = - 8 mA		3.94			3.8		3.8		
V _{OL}	I _{OL} = 50 μA	2 V			0.1		0.1		V	
		3 V			0.1		0.1			
		4.5 V			0.1		0.1			
	I _{OL} = 4 mA	3 V			0.36		0.5	0.44		
	I _{OL} = 8 mA	4.5 V			0.36		0.5	0.44		
					0.36		0.5	0.44		
I _I	V _I = 5.5 V or GND	0 to 5.5 V			±0.1		±1 ⁽¹⁾		±1	μA
I _{CC}	V _I = V _{CC} or GND I _O = 0	5.5 V			4		40		40	μA
C _i	V _I = V _{CC} or GND	5 V		2	10				10	pF

- (1) On products compliant to MIL-PRF-38535, this parameter is not production tested at V_{CC} = 0 V.
 (2) Product Preview

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

over recommended operating free-air temperature range (unless otherwise noted) (see [Load Circuit and Voltage Waveforms](#))

			$T_A = 25^\circ\text{C}$		SN54AHC594 ⁽²⁾		SN74AHC594		UNIT
			MIN	MAX	MIN	MAX	MIN	MAX	
t_w	Pulse Duration	RCLK or SRCLK high or low	5.5		5.5		5.5		ns
		RCLR or SRCLR low	5		5		5		
t_{su}	Setup time	SER before SRCLK \uparrow	3.5		3.5		3.5		ns
		SRCLK \uparrow before RCLK \uparrow ⁽¹⁾	8		8.5		8.5		
		SRCLR low before SRCLK \uparrow	8		9		9		
		SRCLR high (inactive) before SRCLK \uparrow	4.2		4.8		4.8		
		RCLR high (inactive) before RCLK \uparrow	4.6		5.3		5.3		
t_h	Hold time, data after CLK \uparrow	SER after SRCLK \uparrow	1.5		1.5		1.5		ns

- (1) This setup time allows the storage register to receive stable data from the shift register. The clocks can be tied together, in which case the shift register is one clock pulse ahead of the storage register.
 (2) Product Preview

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

over recommended operating free-air temperature range (unless otherwise noted) (see [Load Circuit and Voltage Waveforms](#))

			$T_A = 25^\circ\text{C}$		SN54AHC594 ⁽²⁾		SN74AHC594		UNIT
			MIN	MAX	MIN	MAX	MIN	MAX	
t_w	Pulse Duration	RCLK or SRCLK high or low	5		5		5		ns
		RCLR or SRCLR low	5.2		5.2		5.2		
t_{su}	Setup time	SER before SRCLK \uparrow	3		3		3		ns
		SRCLK \uparrow before RCLK \uparrow ⁽¹⁾	5		5		5		
		SRCLR low before SRCLK \uparrow	5		5		5		
		SRCLR high (inactive) before SRCLK \uparrow	2.9		3.3		3.3		
		RCLR high (inactive) before RCLK \uparrow	3.2		3.7		3.7		
t_h	Hold time, data after CLK \uparrow	SER after SRCLK \uparrow	2		2		2		ns

- (1) This setup time allows the storage register to receive stable data from the shift register. The clocks can be tied together, in which case the shift register is one clock pulse ahead of the storage register.
 (2) Product Preview

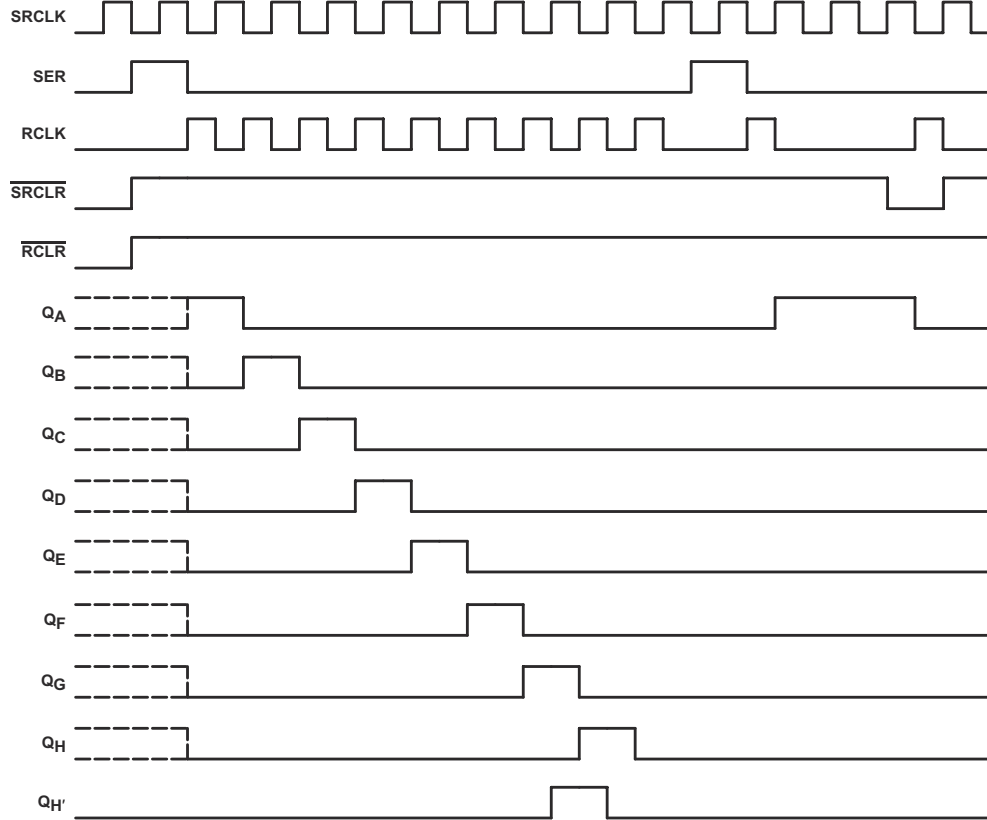


图 5-1. Timing Diagram

5.8 Switching Characteristics, $V_{CC} = 3.3 V \pm 0.3 V$

over recommended operating free-air temperature range (unless otherwise noted) (see [Load Circuit and Voltage Waveforms](#))

PARAMETER	FROM (INPUT)	TO (OUTPUT)	LOAD CAPACITANCE	$T_A = 25^\circ C$			SN54AHC594 ⁽²⁾		SN74AHC594		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
f_{max}			$C_L = 15 \text{ pF}$	80 ⁽¹⁾	120 ⁽²⁾		70 ⁽¹⁾	70			MHz
			$C_L = 50 \text{ pF}$	55	105		50	50			
t_{PLH}	RCLK	$Q_A - Q_H$	$C_L = 15 \text{ pF}$		4.6 ⁽¹⁾	8 ⁽¹⁾	1 ⁽¹⁾	8.5 ⁽¹⁾	1	8.5	ns
t_{PHL}					4.9 ⁽¹⁾	8.2 ⁽¹⁾	1 ⁽¹⁾	8.8 ⁽¹⁾	1	8.8	
t_{PLH}	SRCLK	$Q_{H'}$	$C_L = 15 \text{ pF}$		5.4 ⁽¹⁾	9.1 ⁽¹⁾	1 ⁽¹⁾	9.7 ⁽¹⁾	1	9.7	ns
t_{PHL}					5.5 ⁽¹⁾	9.2 ⁽¹⁾	1 ⁽¹⁾	9.9 ⁽¹⁾	1	9.9	
t_{PHL}	RCLR	$Q_A - Q_H$	$C_L = 15 \text{ pF}$		6 ⁽¹⁾	9.8 ⁽¹⁾	1 ⁽¹⁾	10.6 ⁽¹⁾	1	10.6	ns
t_{PHL}	SRCLR	$Q_{H'}$	$C_L = 15 \text{ pF}$		5.6 ⁽¹⁾	9.2 ⁽¹⁾	1 ⁽¹⁾	10 ⁽¹⁾	1	10	ns
t_{PLH}	RCLK	$Q_A - Q_H$	$C_L = 50 \text{ pF}$		6.9	10.5	1	11.1	1	11.1	ns
t_{PHL}					8.1	11.9	1	13.1	1	13.1	
t_{PLH}	SRCLK	$Q_{H'}$	$C_L = 50 \text{ pF}$		7.7	11.7	1	12.4	1	12.4	ns
t_{PHL}					8.4	12.5	1	13.9	1	13.9	
t_{PHL}	RCLR	$Q_A - Q_H$	$C_L = 50 \text{ pF}$		9.1	13.1	1	14.4	1	14.4	ns
t_{PHL}	SRCLR	$Q_{H'}$	$C_L = 50 \text{ pF}$		8.5	12.4	1	14	1	14	ns

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

(2) Product Preview

5.9 Switching Characteristics, $V_{CC} = 5 V \pm 0.5 V$

over recommended operating free-air temperature range (unless otherwise noted) (see [Load Circuit and Voltage Waveforms](#))

PARAMETER	FROM (INPUT)	TO (OUTPUT)	LOAD CAPACITANCE	$T_A = 25^\circ\text{C}$			SN54AHC594 ⁽²⁾		SN74AHC594		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
f_{\max}			$C_L = 15 \text{ pF}$	135 ⁽¹⁾	170 ⁽¹⁾		115 ⁽¹⁾		115		MHz
			$C_L = 50 \text{ pF}$	120	140		95		95		
t_{PLH}	RCLK	$Q_A - Q_H$	$C_L = 15 \text{ pF}$		3.3 ⁽¹⁾	6.2 ⁽¹⁾	1 ⁽¹⁾	6.5 ⁽¹⁾	1	6.5	ns
t_{PHL}					3.7 ⁽¹⁾	6.5 ⁽¹⁾	1 ⁽¹⁾	6.9 ⁽¹⁾	1	6.9	
t_{PLH}	SRCLK	$Q_{H'}$	$C_L = 15 \text{ pF}$		3.7 ⁽¹⁾	6.8 ⁽¹⁾	1 ⁽²⁾	7.2 ⁽¹⁾	1	7.2	ns
t_{PHL}					4.1 ⁽¹⁾	7.2 ⁽¹⁾	1 ⁽¹⁾	7.6 ⁽¹⁾	1	7.6	
t_{PHL}	RCLR	$Q_A - Q_H$	$C_L = 15 \text{ pF}$		4.5 ⁽¹⁾	7.6 ⁽¹⁾	1 ⁽¹⁾	8.2 ⁽¹⁾	1	8.2	ns
t_{PHL}	SRCLR	$Q_{H'}$	$C_L = 15 \text{ pF}$		4.1 ⁽¹⁾	7.1 ⁽¹⁾	1 ⁽¹⁾	7.6 ⁽¹⁾	1	7.6	ns
t_{PLH}	RCLK	$Q_A - Q_H$	$C_L = 50 \text{ pF}$		4.9	7.8	1	8.3	1	8.3	ns
t_{PHL}					5.8	8.9	1	9.7	1	9.7	
t_{PLH}	SRCLK	$Q_{H'}$	$C_L = 50 \text{ pF}$		5.5	8.6	1	9.1	1	9.1	ns
t_{PHL}					6	9.2	1	10.1	1	10.1	
t_{PHL}	RCLR	$Q_A - Q_H$	$C_L = 50 \text{ pF}$		6.6	10	1	10.7	1	10.7	ns
t_{PHL}	SRCLR	$Q_{H'}$	$C_L = 50 \text{ pF}$		6	9.2	1	10.1	1	10.1	ns

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

(2) Product Preview

5.10 Noise Characteristics

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

PARAMETER		SN74AHC594			UNIT
		MIN	TYP	MAX	
$V_{OL(P)}$	Quiet output, maximum dynamic V_{OL}		1		V
$V_{OL(V)}$	Quiet output, minimum dynamic V_{OL}		-0.6		V
$V_{OH(V)}$	Quiet output, minimum dynamic V_{OH}		3.8		V
$V_{IH(D)}$	High-level dynamic input voltage	3.5			V
$V_{IL(D)}$	Low-level dynamic input voltage			1.5	V

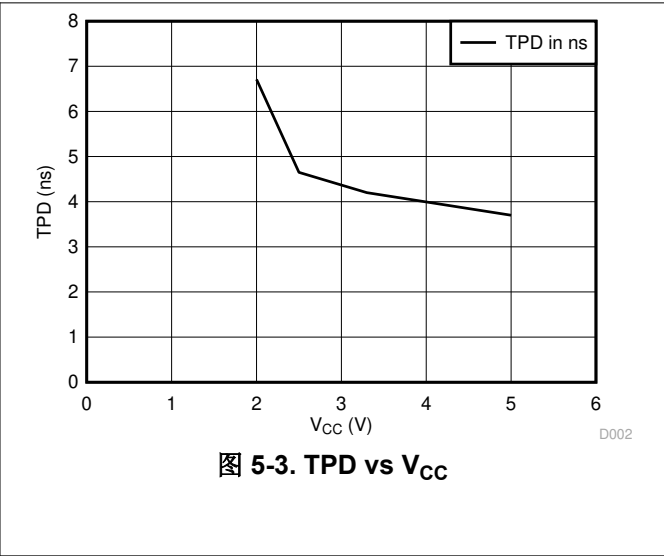
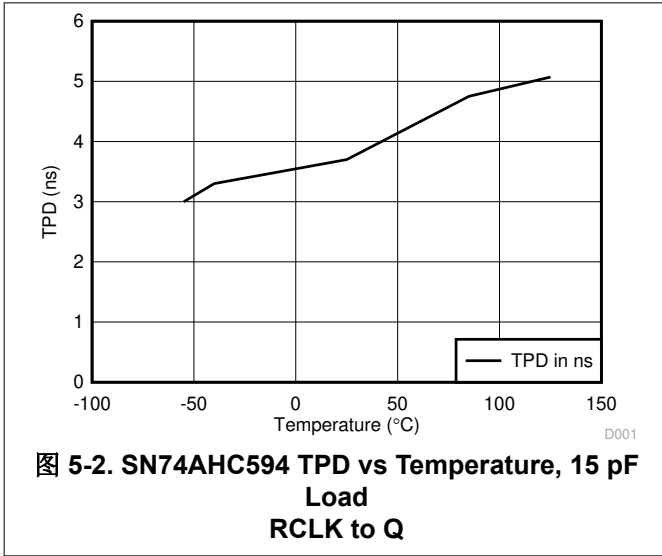
(1) Characteristics are for surface-mount packages only.

5.11 Operating Characteristics

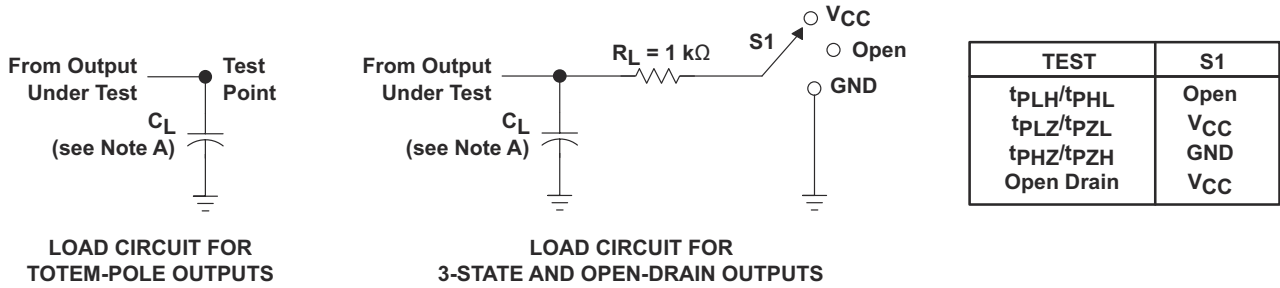
$V_{CC} = 5 V$, $T_A = 25^\circ\text{C}$

PARAMETER		TEST CONDITIONS	TYP	UNIT
C_{pd}	Power dissipation capacitance	No load, $f = 1 \text{ MHz}$	112	pF

5.12 Typical Characteristics

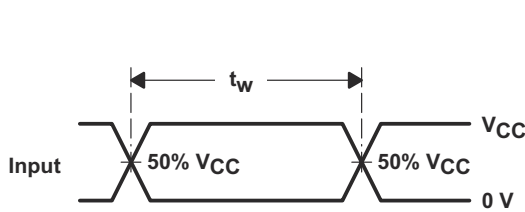


6 Parameter Measurement Information

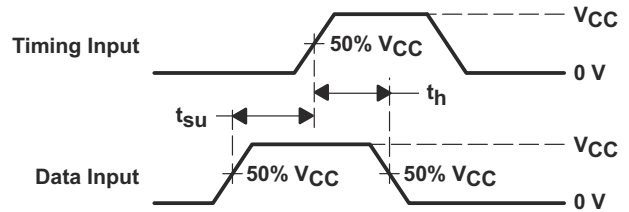


LOAD CIRCUIT FOR TOTEM-POLE OUTPUTS

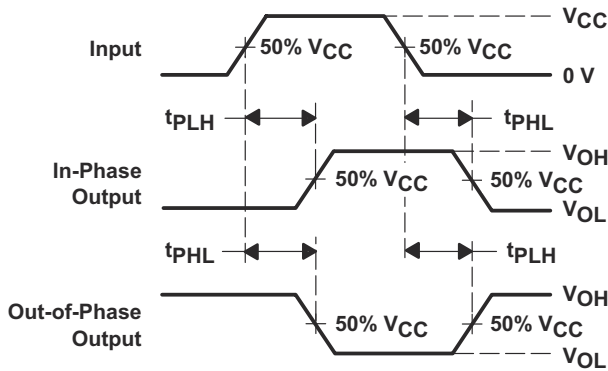
LOAD CIRCUIT FOR 3-STATE AND OPEN-DRAIN OUTPUTS



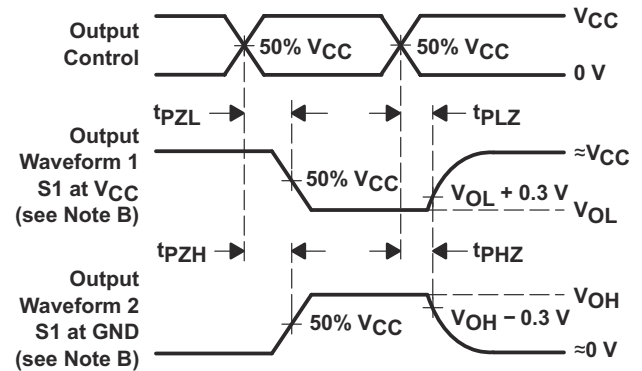
VOLTAGE WAVEFORMS PULSE DURATION



VOLTAGE WAVEFORMS SETUP AND HOLD TIMES



VOLTAGE WAVEFORMS PROPAGATION DELAY TIMES INVERTING AND NONINVERTING OUTPUTS



VOLTAGE WAVEFORMS ENABLE AND DISABLE TIMES LOW- AND HIGH-LEVEL ENABLING

- NOTES: 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: $PRR \leq 1$ MHz, $Z_O = 50 \Omega$, $t_r \leq 3$ ns, $t_f \leq 3$ ns.
 D. The outputs are measured one at a time with one input transition per measurement.

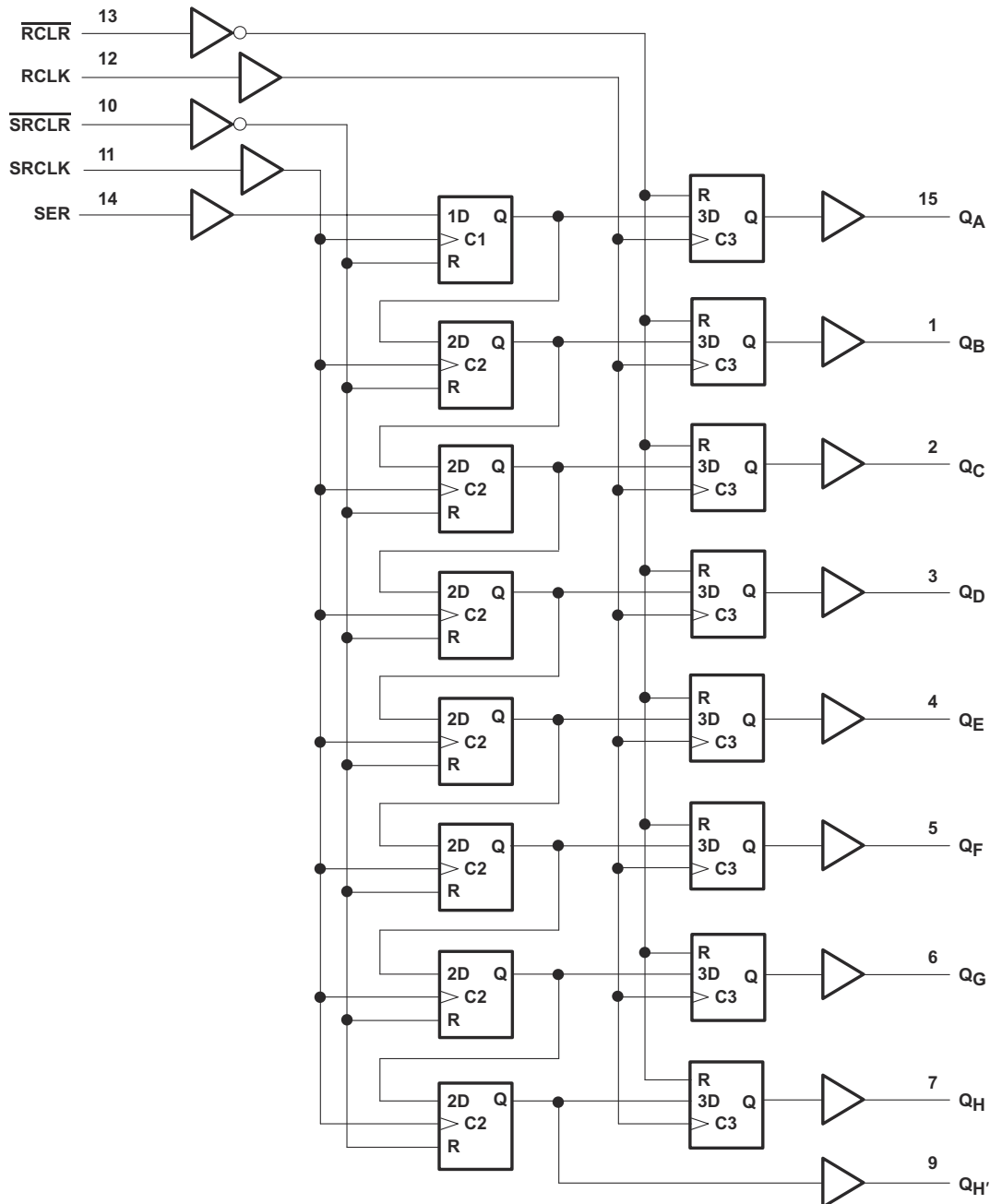
图 6-1. Load Circuit and Voltage Waveforms

7 Detailed Description

7.1 Overview

The SNx4AHC594 devices contain an 8-bit serial-in, parallel-out shift register that feeds an 8-bit D-type storage register. Separate clocks and direct overriding clear ($\overline{\text{SRCLR}}$, $\overline{\text{RCLR}}$) inputs are provided on the shift and storage registers. A serial ($Q_{H'}$) output is provided for cascading purposes. The shift register (SRCLK) and storage register (RCLK) clocks are positive-edge triggered. If the clocks are tied together, the shift register always is one clock pulse ahead of the storage register.

7.2 Functional Block Diagram



Pin numbers shown are for the D, DB, J, N, NS, PW, and W packages.

7.3 Feature Description

- Allows for down translation
 - Inputs are tolerant up to 5.5 V
- Slow edges for reduced noise
- Low power

7.4 Device Functional Modes

表 7-1. Function Table

INPUTS					FUNCTION
SER	SRCLK	SRCLR	RCLK	RCLR	
X	X	L	X	X	Shift register is cleared.
L	↑	H	X	X	First stage of shift register goes low. Other stages store the data of previous stage, respectively.
H	↑	H	X	X	First stage of shift register goes high. Other stages store the data of previous stage, respectively.
L	↓	H	X	X	Shift register state is not changed.
X	X	X	X	L	Storage register is cleared.
X	X	X	↑	H	Shift register data is stored in the storage register.
X	X	X	↓	H	Storage register state is not changed.

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 Application Information

The SN74AHC594 is a low-drive CMOS device that can be used for a multitude of bus interface type applications where output ringing is a concern. The low drive and slow edge rates will minimize overshoot and undershoot on the outputs. The inputs accept voltages up to 5.5 V allowing down translation to the V_{CC} level. 图 8-2 shows how the slower edges can reduce ringing on the output compared to higher drive parts like AC.

8.2 Typical Application

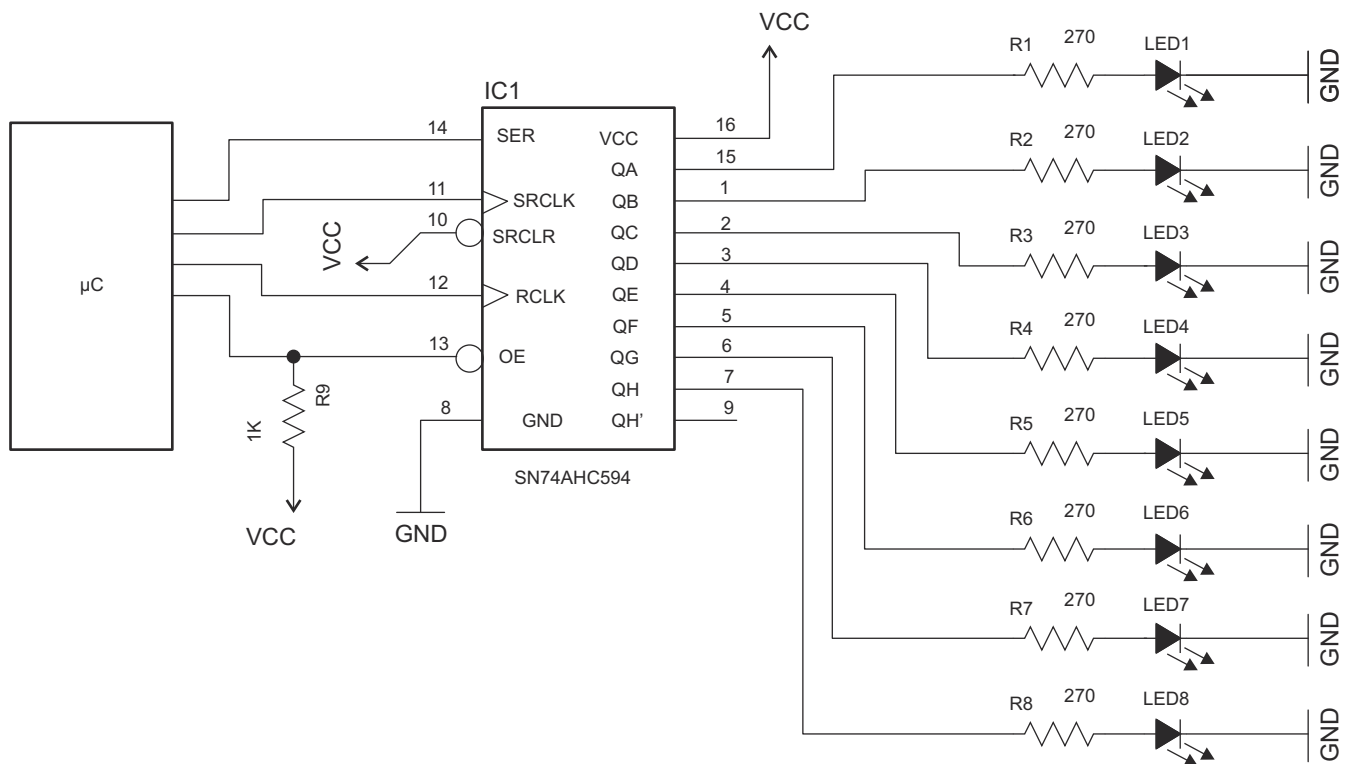


图 8-1. Typical Application Schematic

8.2.1 Design Requirements

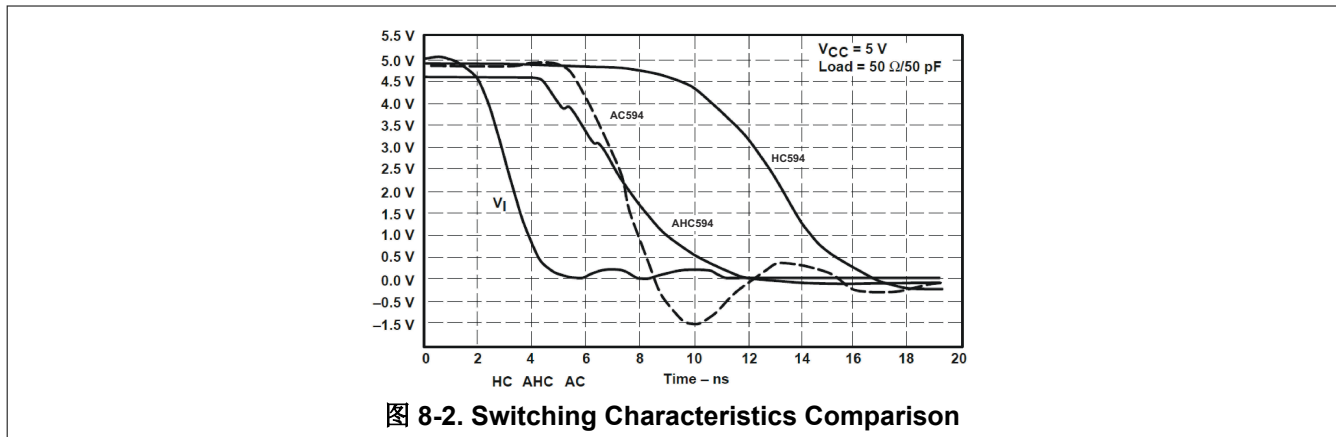
This device uses CMOS technology and has balanced output drive. Care should be taken to avoid bus contention because it can drive currents that would exceed maximum limits. Outputs can be combined to produce higher drive but the high drive will also create faster edges into light loads, so routing and load conditions should be considered to prevent ringing.

8.2.2 Detailed Design Procedure

- Recommended Input Conditions
 - Rise time and fall time specs: See $(\Delta t / \Delta V)$ in the [Recommended Operating Conditions](#) table.
 - Specified high and low levels: See $(V_{IH}$ and $V_{IL})$ in the [Recommended Operating Conditions](#) table.
 - Inputs are overvoltage tolerant allowing them to go as high as 5.5 V at any valid V_{CC} .
- Recommend Output Conditions

- Load currents should not exceed 25 mA per output and 75 mA total for the part.
- Outputs should not be pulled above V_{CC} .

8.2.3 Application Curves



8.3 Power Supply Recommendations

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

Each V_{CC} pin should have a good bypass capacitor to prevent power disturbance. For devices with a single supply, 0.1 μF is recommended; if there are multiple V_{CC} pins, then 0.01 μF or 0.022 μF is recommended for each power pin. It is acceptable to parallel multiple bypass caps to reject different frequencies of noise. A 0.1 μF and a 1 μF are commonly used in parallel. The bypass capacitor should be installed as close to the power pin as possible for best results.

8.4 Layout

8.4.1 Layout Guidelines

When using multiple-bit logic devices, inputs should never 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. [图 8-3](#) specifies 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 makes more sense or is more convenient. It is generally acceptable to float outputs, unless the part is a transceiver. If the transceiver has an output enable pin, it will disable the output section of the part when asserted. This will not disable the input section of the IOs, so they cannot float when disabled.

8.4.2 Layout Example

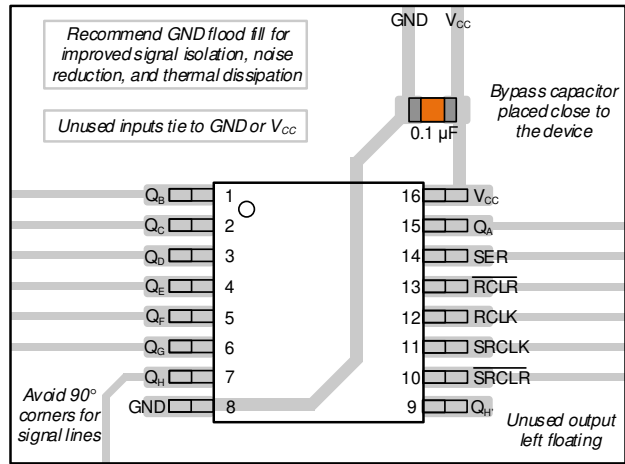


图 8-3. Example Layout for the SN74AHC594

9 Device and Documentation Support

9.1 Documentation Support (Analog)

9.1.1 Related Links

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.

表 9-1. Related Links

PARTS	PRODUCT FOLDER	SAMPLE & BUY	TECHNICAL DOCUMENTS	TOOLS & SOFTWARE	SUPPORT & COMMUNITY
SN54AHC594	Click here	Click here	Click here	Click here	Click here
SN74AHC594	Click here	Click here	Click here	Click here	Click here

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 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。

9.3 支持资源

TI E2E™ [支持论坛](#) 是工程师的重要参考资料，可直接从专家获得快速、经过验证的解答和设计帮助。搜索现有解答或提出自己的问题可获得所需的快速设计帮助。

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

9.4 Trademarks

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9.5 静电放电警告



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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 G (July 2014) to Revision H (April 2024) Page

• 向 器件信息 表添加了封装尺寸，删除了对机器放电模型的引用，并更新了布局结构以满足现行数据表标准的要求.....	1
• Updated thermal values for PW package from $R_{\theta JA} = 105.7$ to 135.9 , $R_{\theta JC(top)} = 40.4$ to 70.3 , $R_{\theta JB} = 50.7$ to 81.3 , $\Psi_{JT} = 3.7$ to 22.5 $\Psi_{JB} = 50.1$ to 80.8 , all values in $^{\circ}C/W$	5

Changes from Revision F (September 2003) to Revision G (July 2014) Page

• 根据新的 TI 数据表标准更新了文档。.....	1
• 删除了“订购信息”表.....	1

- 添加了“应用” 1
- Added Pin Functions table.3
- Added Handling Ratings table.....4
- Changed MAX operating temperature from 85°C to 125°C in Recommended Operating Conditions table.4
- Added Typical Characteristics section.9
- Added Detailed Description section.....11
- Added Application and Implementation section.13
- Added Power Supply Recommendations and Layout sections..... 14

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
SN74AHC594DBR	ACTIVE	SSOP	DB	16	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 125	HA594	Samples
SN74AHC594DR	ACTIVE	SOIC	D	16	2500	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 125	AHC594	Samples
SN74AHC594DRG4	ACTIVE	SOIC	D	16	2500	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 125	AHC594	Samples
SN74AHC594N	ACTIVE	PDIP	N	16	25	RoHS & Green	NIPDAU	N / A for Pkg Type	-40 to 125	SN74AHC594N	Samples
SN74AHC594NSR	ACTIVE	SO	NS	16	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 125	AHC594	Samples
SN74AHC594PWR	ACTIVE	TSSOP	PW	16	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 125	HA594	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 <=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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OTHER QUALIFIED VERSIONS OF SN74AHC594 :

- Automotive : [SN74AHC594-Q1](#)

NOTE: Qualified Version Definitions:

- Automotive - Q100 devices qualified for high-reliability automotive applications targeting zero defects

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
SN74AHC594DBR	SSOP	DB	16	2000	330.0	16.4	8.35	6.6	2.4	12.0	16.0	Q1
SN74AHC594DR	SOIC	D	16	2500	330.0	16.4	6.5	10.3	2.1	8.0	16.0	Q1
SN74AHC594NSR	SO	NS	16	2000	330.0	16.4	8.2	10.5	2.5	12.0	16.0	Q1
SN74AHC594PWR	TSSOP	PW	16	2000	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1

TAPE AND REEL BOX DIMENSIONS



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74AHC594DBR	SSOP	DB	16	2000	356.0	356.0	35.0
SN74AHC594DR	SOIC	D	16	2500	340.5	336.1	32.0
SN74AHC594NSR	SO	NS	16	2000	356.0	356.0	35.0
SN74AHC594PWR	TSSOP	PW	16	2000	356.0	356.0	35.0

TUBE


*All dimensions are nominal

Device	Package Name	Package Type	Pins	SPQ	L (mm)	W (mm)	T (μm)	B (mm)
SN74AHC594N	N	PDIP	16	25	506	13.97	11230	4.32
SN74AHC594N	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.
 -  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.
 -  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.

D (R-PDSO-G16)

PLASTIC SMALL OUTLINE



- NOTES:
- All linear dimensions are in millimeters.
 - This drawing is subject to change without notice.
 - Publication IPC-7351 is recommended for alternate designs.
 - Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Refer to IPC-7525 for other stencil recommendations.
 - Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.



4220204/A 02/2017

NOTES:

1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 mm per side.
4. This dimension does not include interlead flash. Interlead flash shall not exceed 0.25 mm per side.
5. Reference JEDEC registration MO-153.

EXAMPLE BOARD LAYOUT

PW0016A

TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE: 10X



4220204/A 02/2017

NOTES: (continued)

- 6. Publication IPC-7351 may have alternate designs.
- 7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

EXAMPLE STENCIL DESIGN

PW0016A

TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE



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

4220204/A 02/2017

NOTES: (continued)

8. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
9. Board assembly site may have different recommendations for stencil design.

DB0016A



PACKAGE OUTLINE

SSOP - 2 mm max height

SMALL OUTLINE PACKAGE



4220763/A 05/2022

NOTES:

- All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
- This drawing is subject to change without notice.
- 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.
- Reference JEDEC registration MO-150.

EXAMPLE STENCIL DESIGN

DB0016A

SSOP - 2 mm max height

SMALL OUTLINE PACKAGE



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

4220763/A 05/2022

NOTES: (continued)

7. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
8. Board assembly site may have different recommendations for stencil design.

MECHANICAL DATA

NS (R-PDSO-G**)

PLASTIC SMALL-OUTLINE PACKAGE

14-PINS SHOWN



- NOTES:
- A. All linear dimensions are in millimeters.
 - B. This drawing is subject to change without notice.
 - C. Body dimensions do not include mold flash or protrusion, not to exceed 0,15.



PACKAGE OUTLINE

NS0016A

SOP - 2.00 mm max height

SOP



4220735/A 12/2021

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 0.25 mm, per side.

EXAMPLE BOARD LAYOUT

NS0016A

SOP - 2.00 mm max height

SOP



4220735/A 12/2021

NOTES: (continued)

5. Publication IPC-7351 may have alternate designs.

6. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

EXAMPLE STENCIL DESIGN

NS0016A

SOP - 2.00 mm max height

SOP



SOLDER PASTE EXAMPLE
BASED ON 0.125 mm THICK STENCIL
SCALE:7X

4220735/A 12/2021

NOTES: (continued)

7. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
8. Board assembly site may have different recommendations for stencil design.

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.
 - C Falls within JEDEC MS-001, except 18 and 20 pin minimum body length (Dim A).
 - D The 20 pin end lead shoulder width is a vendor option, either half or full width.

4040049/E 12/2002

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