

## SNx4HC166 8 位并行负载移位寄存器

### 1 特性

- 2V 至 6V 的宽工作电压范围
- 输出可驱动多达 10 个 LSTTL 负载
- 低功耗， $I_{CC}$  最大值为 80  $\mu$ A
- $t_{pd}$  典型值 = 13ns
- $\pm 4$ mA 输出驱动 (在 5V 时)
- 低输入电流，最大值 1 $\mu$ A
- 同步负载
- 直接覆盖清零
- 并行转串行转换

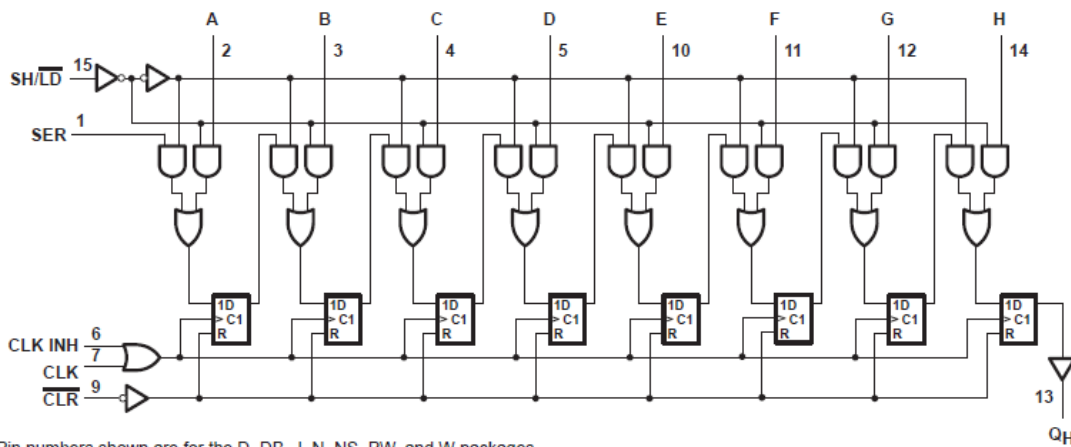
### 2 说明

SNx4HC166 器件包含一个 8 位移位寄存器，具有一路串行输入和八路并行负载输入。

器件信息

零件编号	封装 <sup>(1)</sup>	封装尺寸 (标称值)
SN74HC166D	SOIC (16)	9.90mm × 3.90mm
SN74HC166DB	SSOP (16)	6.20mm × 5.30mm
SN74HC166N	PDIP (16)	19.31mm × 6.35mm
SN74HC166NS	SO (16)	6.20mm × 5.30mm
SN74HC166PW	TSSOP (16)	5.00mm × 4.40mm
SN54HC166J	CDIP (16)	24.38mm × 6.92mm
SNJ54HC166FK	LCCC (20)	8.89mm × 8.45mm
SNJ54HC166J	CFP (16)	10.16mm × 6.73mm

(1) 如需了解所有可用封装，请参阅数据表末尾的可订购产品附录。



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

功能框图



## Table of Contents

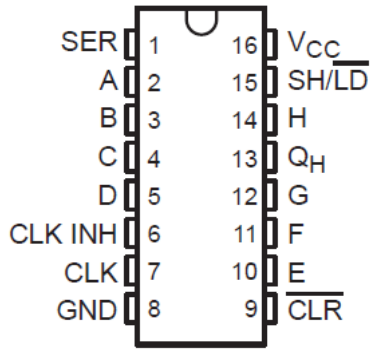
<b>1 特性</b> .....	1	7.1 Overview.....	9
<b>2 说明</b> .....	1	7.2 Functional Block Diagram.....	9
<b>3 Revision History</b> .....	2	7.3 Device Functional Modes.....	9
<b>4 Pin Configuration and Functions</b> .....	3	<b>8 Power Supply Recommendations</b> .....	10
<b>5 Specifications</b> .....	4	<b>9 Layout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

## 3 Revision History

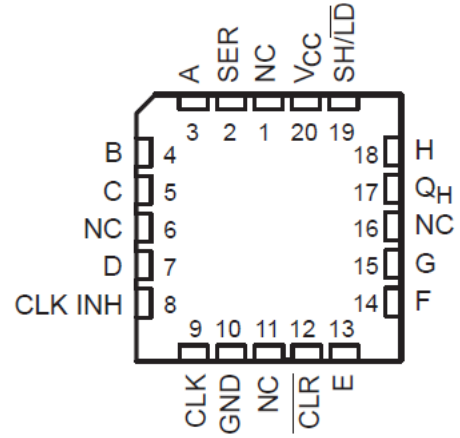
注：以前版本的页码可能与当前版本的页码不同

<b>Changes from Revision D (December 1982) to Revision E (February 2022)</b>	<b>Page</b>
• 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, D, DB, N, NS, or PW Package**  
**16-Pin CDIP, SOIC, SSOP, PDIP, SO, TSSOP**  
**Top View**



NC - No internal connection  
**FK Package**  
**20-Pin LCCC**  
**Top View**

## 5 Specifications

### 5.1 Absolute Maximum Ratings

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

		MIN	MAX	UNIT
V <sub>CC</sub>	Supply voltage range	- 0.5	7	V
I <sub>IK</sub>	Input clamp current <sup>(2)</sup>	V <sub>I</sub> < 0 or V <sub>I</sub> > V <sub>CC</sub>	±20	mA
I <sub>OK</sub>	Output clamp current <sup>(2)</sup>	V <sub>O</sub> < 0 or V <sub>O</sub> > V <sub>CC</sub>	±20	mA
I <sub>O</sub>	Continuous output current	V <sub>O</sub> = 0 to V <sub>CC</sub>	±25	mA
	Continuous current through V <sub>CC</sub> or GND		±50	mA
T <sub>J</sub>	Junction temperature		150	°C
T <sub>stg</sub>	Storage temperature	- 65	150	°C

- Stresses beyond those listed under *absolute maximum ratings* may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions beyond those indicated under [§ 5.2](#) is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.
- The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

### 5.2 Recommended Operating Conditions<sup>(1)</sup>

		SN54HC166			SN74HC166			UNIT
		MIN	NOM	MAX	MIN	NOM	MAX	
V <sub>CC</sub>	Supply voltage	2	5	6	2	5	6	V
V <sub>IH</sub>	High-level input voltage	V <sub>CC</sub> = 2 V	1.5		1.5			V
		V <sub>CC</sub> = 4.5 V	3.15		3.15			
		V <sub>CC</sub> = 6 V	4.2		4.2			
V <sub>IL</sub>	Low-level input voltage	V <sub>CC</sub> = 2 V		0.5			0.5	V
		V <sub>CC</sub> = 4.5 V		1.35		1.35		
		V <sub>CC</sub> = 6 V		1.8		1.8		
V <sub>I</sub>	Input voltage	0		V <sub>CC</sub>	0		V <sub>CC</sub>	V
V <sub>O</sub>	Output voltage	0		V <sub>CC</sub>	0		V <sub>CC</sub>	V
Δt / Δv <sup>(2)</sup>	Input transition rise/fall time	V <sub>CC</sub> = 2 V		1000			1000	ns
		V <sub>CC</sub> = 4.5 V		500		500		
		V <sub>CC</sub> = 6 V		400		400		
T <sub>A</sub>	Operating free-air temperature	-55		125	-40		85	°C

- All unused inputs of the device must be held at V<sub>CC</sub> or GND to ensure proper device operation. Refer to the TI application report, *Implications of Slow or Floating CMOS Inputs*, literature number [SCBA004](#).
- If this device is used in the threshold region (from V<sub>IL,max</sub> = 0.5 V to V<sub>IH,min</sub> = 1.5 V), there is a potential to go into the wrong state from induced grounding, causing double clocking. Operating with the inputs at t<sub>r</sub> = 1000 ns and V<sub>CC</sub> = 2 V does not damage the device; however, functionally, the CLK inputs are not ensured while in the shift, count, or toggle operating modes.

### 5.3 Thermal Information

THERMAL METRIC		D (SOIC)	DB (SSOP)	N (PDIP)	NS (SO)	PW (TSSOP)	UNIT
		16 PINS	16 PINS	16 PINS	16 PINS	16 PINS	
R <sub>θJA</sub>	Junction-to-ambient thermal resistance <sup>(1)</sup>	73	82	67	64	108	°C/W

- For more information about traditional and new thermal metrics, see the [Semiconductor and IC package thermal metrics](#) application report.

## 5.4 Electrical Characteristics

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

PARAMETER	TEST CONDITIONS <sup>(1)</sup>	V <sub>CC</sub> (V)	T <sub>A</sub> = 25°C			SN54HC166		SN74HC166		UNIT
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
V <sub>OH</sub>	I <sub>OH</sub> = -20 μA	2	1.9	1.998		1.9		1.9	V	
		4.5	4.4	4.499		4.4		4.4		
		6	5.9	5.999		5.9		5.9		
	I <sub>OH</sub> = -4 mA	4.5	3.98	4.3		3.7		3.84		
	I <sub>OH</sub> = -5.2 mA	6	5.48	5.8		5.2		5.34		
V <sub>OL</sub>	I <sub>OL</sub> = 20 μA	2		0.002	0.1		0.1	0.1	V	
		4.5		0.001	0.1		0.1	0.1		
		6		0.001	0.1		0.1	0.1		
	I <sub>OL</sub> = 4 mA	4.5		0.17	0.26		0.4	0.33		
	I <sub>OL</sub> = 5.2 mA	6		0.15	0.26		0.4	0.33		
I <sub>I</sub>	V <sub>I</sub> = V <sub>CC</sub> or 0	6		±0.1	±100		±1000	±1000	nA	
I <sub>CC</sub>	V <sub>I</sub> = V <sub>CC</sub> or 0, I <sub>O</sub> = 0	6			8		160	80	μA	
C <sub>i</sub>		2 to 6		3	10		10	10	pF	

(1) V<sub>I</sub> = V<sub>IH</sub> or V<sub>IL</sub>, unless otherwise noted.

### 5.5 Timing Requirements

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

			V <sub>CC</sub> (V)	T <sub>A</sub> = 25°C		SN54HC166		SN74HC166		UNIT
				MIN	MAX	MIN	MAX	MIN	MAX	
f <sub>clock</sub>	Clock frequency		2	6		4.2		5		MHz
			4.5	31		21		25		
			6	36		25		29		
t <sub>w</sub>	Pulse duration	CLR low	2	100		150		125		ns
			4.5	20		30		25		
			6	17		26		21		
	CLK high or low	2	80		120		100			
		4.5	16		24		20			
		6	14		20		17			
t <sub>su</sub>	Setup time	SH/ $\overline{\text{LD}}$ high before CLK ↑	2	145		220		180		ns
			4.5	29		44		36		
			6	25		38		31		
		SER before CLK ↑	2	80		120		100		
			4.5	16		24		20		
			6	14		20		17		
		CLK INH low before CLK- ↑	2	100		150		125		
			4.5	20		30		25		
			6	17		26		21		
	Data before CLK ↑	2	80		120		100			
		4.5	16		24		20			
		6	14		20		17			
	$\overline{\text{CLR}}$ inactive before CLK ↑	2	40		60		50			
		4.5	8		12		10			
		6	7		10		9			
t <sub>h</sub>	Hold time	SH/ $\overline{\text{LD}}$ high after CLK ↑	2	0		0		0		ns
			4.5	0		0		0		
			6	0		0		0		
		SER after CLK ↑	2	5		5		5		
			4.5	5		5		5		
			6	5		5		5		
		CLK INH high after CLK ↑	2	0		0		0		
			4.5	0		0		0		
			6	0		0		0		
		Data after CLK ↑	2	5		5		5		
			4.5	5		5		5		
			6	5		5		5		

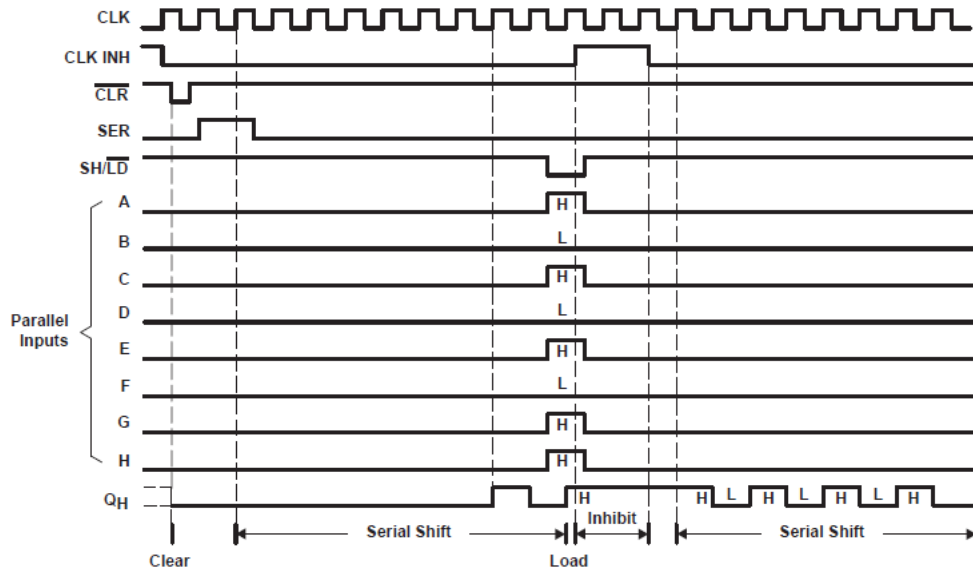


图 5-1. Typical Clear, Shift, Load, Inhibit, and Shift Sequence

## 5.6 Switching Characteristics

over recommended operating free-air temperature range,  $C_L = 50$  pF (unless otherwise noted) (see Figure 6)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	$V_{CC}$ (V)	$T_A = 25^\circ\text{C}$			SN54HC166		SN74HC166		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
$f_{max}$			2	6	11		4.2		5	MHz	
			4.5	31	36		21		25		
			6	36	45		25		29		
$t_{PHL}$	$\overline{CLR}$	$Q_H$	2		62	120		180		150	ns
			4.5		18	24		36		30	
			6		13	20		31		26	
$t_{pd}$	CLK	$Q_H$	2		75	150		225		190	ns
			4.5		15	30		45		38	
			6		13	26		38		32	
$t_t$		Any	2		38	75		110		95	ns
			4.5		8	15		22		19	
			6		6	13		19		16	

## 5.7 Operating Characteristics

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

PARAMETER	TEST CONDITIONS	TYP	UNIT
$C_{pd}$	Power dissipation capacitance No load	50	pF

## 6 Parameter Measurement Information

$t_{pd}$  is the maximum between  $t_{PLH}$  and  $t_{PHL}$

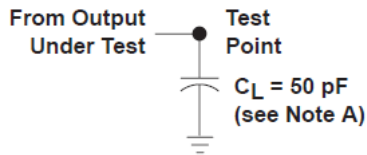


图 6-1. Load Circuit

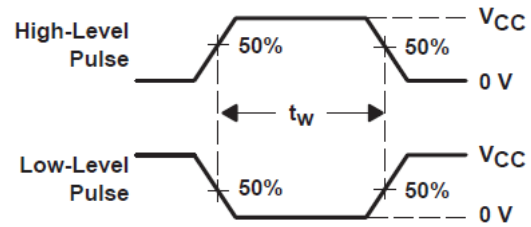


图 6-2. Voltage Waveforms  
Pulse Durations

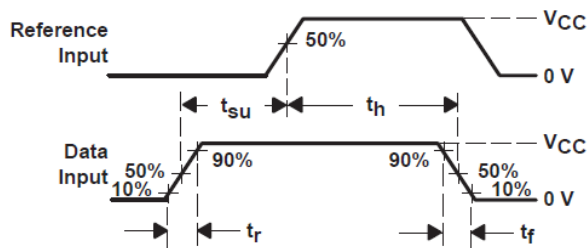


图 6-3. Voltage Waveforms  
Setup and Hold and Input Rise and Fall Times

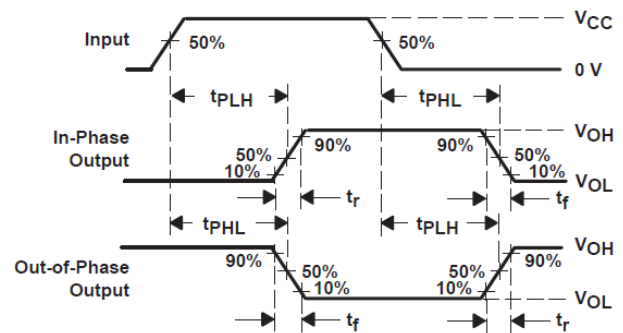


图 6-4. Voltage Waveforms  
Propagation Delay and Output Transition Times

A.  $C_L$  includes probe and jig capacitance.

B. Phase relationships between waveforms were chosen arbitrarily. All input pulses are supplied by generators having the following characteristics:  $PRR \leq 1$  MHz,  $Z_O = 50 \Omega$ ,  $t_r = 6$  ns,  $t_f = 6$  ns.

C. For clock inputs,  $f_{max}$  is measured when the input duty cycle is 50%

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

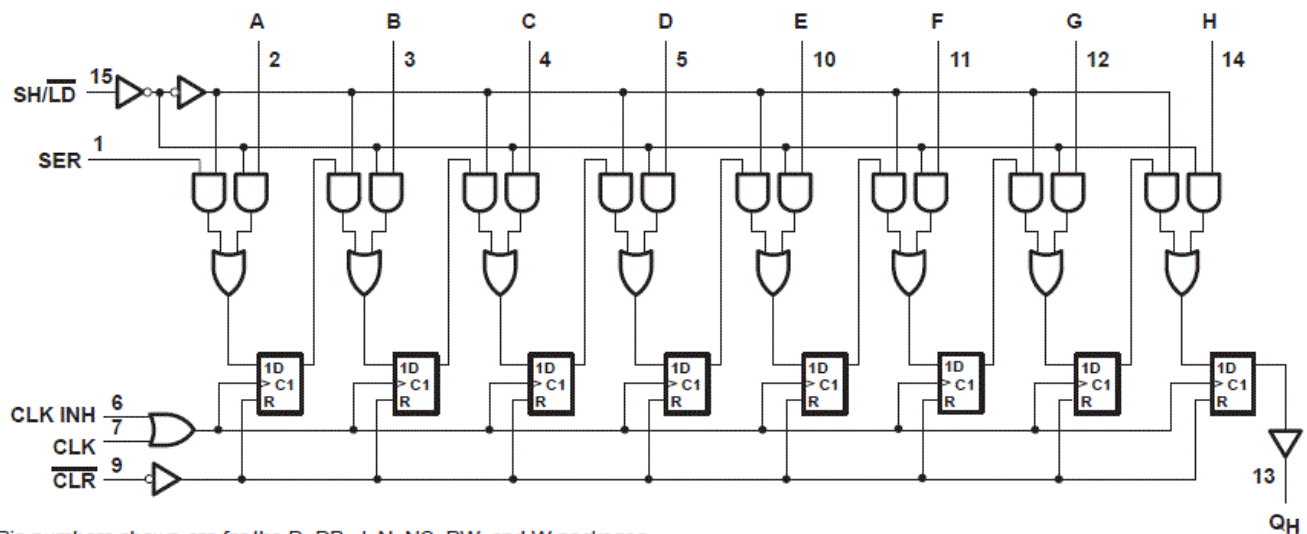


## 7 Detailed Description

### 7.1 Overview

These parallel-in or serial-in, serial-out registers feature gated clock (CLK, CLK INH) inputs and an overriding clear ( $\overline{\text{CLR}}$ ) input. The parallel-in or serial-in modes are established by the shift/load ( $\overline{\text{SH/LD}}$ ) input. When high,  $\overline{\text{SH/LD}}$  enables the serial (SER) data input and couples the eight flip-flops for serial shifting with each clock (CLK) pulse. When low, the parallel (broadside) data inputs are enabled, and synchronous loading occurs on the next clock pulse. During parallel loading, serial data flow is inhibited. Clocking is accomplished on the low-to-high-level edge of CLK through a 2-input positive-NOR gate, permitting one input to be used as a clock-enable or clock-inhibit function. Holding either CLK or CLK INH high inhibits clocking; holding either low enables the other clock input. This allows the system clock to be free running, and the register can be stopped on command with the other clock input. CLK INH should be changed to the high level only when CLK is high.  $\overline{\text{CLR}}$  overrides all other inputs, including CLK, and resets all flip-flops to zero.

### 7.2 Functional Block Diagram



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

### 7.3 Device Functional Modes

表 7-1. Function Table

INPUTS						OUTPUTS		
CLR	SH/LD	CLK INH	CLK	SER	PARALLEL A...H	INTERNAL		QH
						QA	QB	
L	X	X	X	X	X	L	L	L
H	X	L	L	X	X	QA0	QB0	QH0
H	L	L	↑	X	a...h	a	b	h
H	H	L	↑	H	X	H	QAn	QGn
H	H	L	↑	L	X	L	QAn	QGn
H	X	H	↑	X	X	QA0	QB0	QH0

## 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- $\mu$ F capacitor is recommended for this device. It is acceptable to parallel multiple bypass caps to reject different frequencies of noise. The 0.1- $\mu$ F and 1- $\mu$ 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](http://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.

## 重要声明和免责声明

TI 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安全、安保或其他要求。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 (<https://www.ti.com/legal/termsofsale.html>) 或 [ti.com](https://www.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。

邮寄地址: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265  
Copyright © 2021, 德州仪器 (TI) 公司

**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
5962-9050101Q2A	ACTIVE	LCCC	FK	20	55	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	5962-9050101Q2A SNJ54HC 166FK	Samples
5962-9050101QEA	ACTIVE	CDIP	J	16	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	5962-9050101QE A SNJ54HC166J	Samples
5962-9050101VEA	ACTIVE	CDIP	J	16	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	5962-9050101VE A SNV54HC166J	Samples
SN54HC166J	ACTIVE	CDIP	J	16	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	SN54HC166J	Samples
SN74HC166DBR	ACTIVE	SSOP	DB	16	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC166	Samples
SN74HC166DR	ACTIVE	SOIC	D	16	2500	RoHS & Green	NIPDAU   SN	Level-1-260C-UNLIM	-40 to 85	HC166	Samples
SN74HC166DRE4	ACTIVE	SOIC	D	16	2500	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC166	Samples
SN74HC166DRG4	ACTIVE	SOIC	D	16	2500	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC166	Samples
SN74HC166N	ACTIVE	PDIP	N	16	25	RoHS & Green	NIPDAU	N / A for Pkg Type	-40 to 85	SN74HC166N	Samples
SN74HC166NSR	ACTIVE	SO	NS	16	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC166	Samples
SN74HC166PWR	ACTIVE	TSSOP	PW	16	2000	RoHS & Green	NIPDAU   SN	Level-1-260C-UNLIM	-40 to 85	HC166	Samples
SN74HC166PWRG4	ACTIVE	TSSOP	PW	16	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC166	Samples
SNJ54HC166FK	ACTIVE	LCCC	FK	20	55	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	5962-9050101Q2A SNJ54HC 166FK	Samples
SNJ54HC166J	ACTIVE	CDIP	J	16	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	5962-9050101QE A SNJ54HC166J	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.

<sup>(2)</sup> **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.

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

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

<sup>(5)</sup> 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.

<sup>(6)</sup> 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 SN54HC166, SN54HC166-SP, SN74HC166 :**

● Catalog : [SN74HC166](#), [SN54HC166](#)

● Military : [SN54HC166](#)

● Space : [SN54HC166-SP](#)

NOTE: Qualified Version Definitions:

- Catalog - TI's standard catalog product
- Military - QML certified for Military and Defense Applications
- Space - Radiation tolerant, ceramic packaging and qualified for use in Space-based application

**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
SN74HC166DBR	SSOP	DB	16	2000	330.0	16.4	8.35	6.6	2.4	12.0	16.0	Q1
SN74HC166DR	SOIC	D	16	2500	330.0	16.4	6.5	10.3	2.1	8.0	16.0	Q1
SN74HC166DRG4	SOIC	D	16	2500	330.0	16.4	6.5	10.3	2.1	8.0	16.0	Q1
SN74HC166NSR	SO	NS	16	2000	330.0	16.4	8.45	10.55	2.5	12.0	16.2	Q1
SN74HC166NSR	SO	NS	16	2000	330.0	16.4	8.2	10.5	2.5	12.0	16.0	Q1
SN74HC166PWR	TSSOP	PW	16	2000	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1
SN74HC166PWR	TSSOP	PW	16	2000	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1
SN74HC166PWRG4	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)
SN74HC166DBR	SSOP	DB	16	2000	356.0	356.0	35.0
SN74HC166DR	SOIC	D	16	2500	356.0	356.0	35.0
SN74HC166DRG4	SOIC	D	16	2500	340.5	336.1	32.0
SN74HC166NSR	SO	NS	16	2000	356.0	356.0	35.0
SN74HC166NSR	SO	NS	16	2000	367.0	367.0	38.0
SN74HC166PWR	TSSOP	PW	16	2000	356.0	356.0	35.0
SN74HC166PWR	TSSOP	PW	16	2000	356.0	356.0	35.0
SN74HC166PWRG4	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)
5962-9050101Q2A	FK	LCCC	20	55	506.98	12.06	2030	NA
SN74HC166N	N	PDIP	16	25	506	13.97	11230	4.32
SN74HC166N	N	PDIP	16	25	506	13.97	11230	4.32
SNJ54HC166FK	FK	LCCC	20	55	506.98	12.06	2030	NA



# 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



SOLDER MASK DETAILS

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.

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.



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



SOLDER MASK DETAILS

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:

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. Reference JEDEC registration MO-150.

# EXAMPLE BOARD LAYOUT

DB0016A

SSOP - 2 mm max height

SMALL OUTLINE PACKAGE



LAND PATTERN EXAMPLE  
EXPOSED METAL SHOWN  
SCALE: 10X



4220763/A 05/2022

NOTES: (continued)

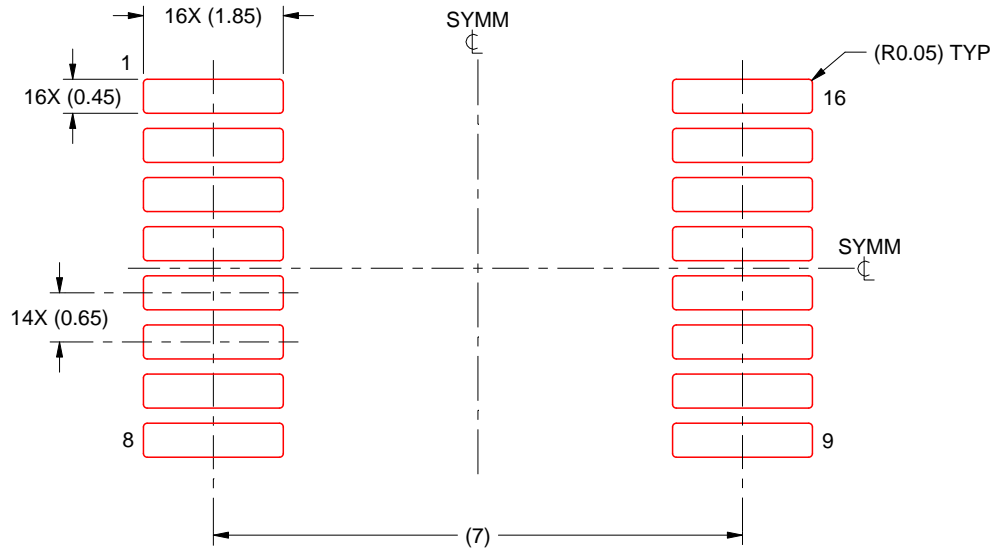
- 5. Publication IPC-7351 may have alternate designs.
- 6. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

# EXAMPLE STENCIL DESIGN

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.

## GENERIC PACKAGE VIEW

**FK 20**

**LCCC - 2.03 mm max height**

8.89 x 8.89, 1.27 mm pitch

LEADLESS CERAMIC CHIP CARRIER

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



4229370VA\

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.

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



## 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