

SNx4HC393 Dual 4-Bit Binary Counters

1 Features

- Wide operating voltage range of 2V to 6V
- Outputs can drive up to 10 LSTTL loads
- Low power consumption: 80µA max I_{CC}
- Typical t_{pd} = 13ns
- ±4mA output drive at 5V
- Low input current of 1µA max
- Dual 4-bit binary counters with individual clocks
- Direct clear for each 4-bit counter
- Can significantly improve system densities by reducing counter package count by 50%

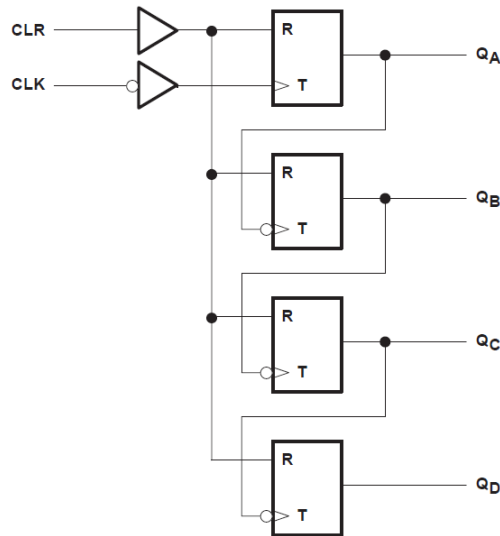
2 Description

The 'HC393 devices contain eight flip-flops and additional gating to implement two individual 4-bit counters in a single package.

Device Information

PART NUMBER	PACKAGE ⁽¹⁾	PACKAGE SIZE ⁽²⁾	BODY SIZE ⁽³⁾
SNx4HC393	D (SOIC, 14)	8.65 mm x 6mm	8.65 mm x 3.9 mm
	N (PDIP, 14))	19.3mm x 9.4mm	19.3mm x 6.35mm
	NS (SOP, 14)	10.3 mm x 7.8mm	10.3 mm x 5.3 mm
	DB (SSOP, 14)	6.2 mm x 7.8mm	6.2 mm x 5.3 mm
	PW (TSSOP, 14)	5 mm x 6.4mm	5 mm x 4.4 mm
	DYY (SOT-23, 14)	4.2mm x 3.26mm	4.2mm x 2mm
	J (CDIP, 14)	19.55mm x 7.9mm	19.55 mm x 6.7mm
	W (CFP, 14)	9.21mm x 9 mm	9.21mm x 6.28mm
FK (LCCC, 14)	8.9mm x 8.9mm	8.9mm x 8.9mm	

- (1) For more information, see [Mechanical, Packaging, and Orderable Information](#).
- (2) The package size (length × width) is a nominal value and includes pins, where applicable.
- (3) The body size (length × width) is a nominal value and does not include pins.



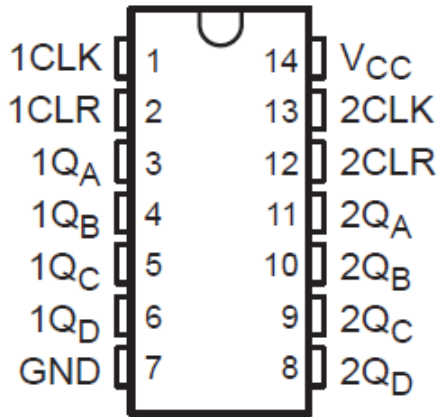
Logic Diagram, Each Counter (Positive Logic)



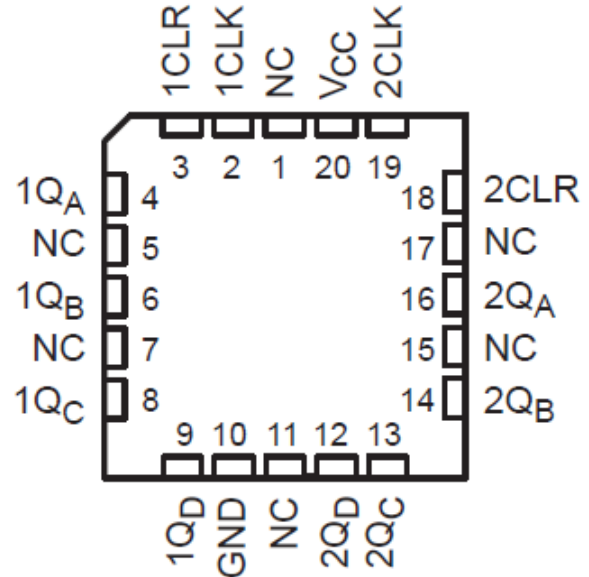
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3 Pin Configuration and Functions



**SN54HC393 J or W Package, 14-Pin CDIP or CFP;
SN74HC393 D, DB, DYY, N, NS, or PW Package; 14-
Pin SOIC, SSOP, SOT-23, TVSOP, SOP, or TSSOP
(Top View)**



A. NC - No internal connection

**SN54HC393 FK Package, 20-Pin LCCC
(Top View)**

Table 3-1. Pin Functions

PIN		TYPE ¹	DESCRIPTION
NAME	NO.		
1CLK	1	I	Counter 1 Clock Input
1CLR	2	I	Counter 1 Clear Input
1Q _A	3	O	Counter 1 A Output
1Q _B	4	O	Counter 1 B Output
1Q _C	5	O	Counter 1 B Output
1Q _D	6	O	Counter 1 B Output
GND	7	G	Ground
2Q _D	8	O	Counter 2 D Output
2Q _C	9	O	Counter 2 C Output
2Q _B	10	O	Counter 2 B Output
2Q _A	11	O	Counter 2 A Output
2CLR	12	I	Counter 2 Clear Input
2CLK	13	I	Counter 2 Clock Input
V _{CC}	14	P	V _{CC}

1. I = Input, O = Output, I/O = Input or Output, G = Ground, P = Power.

4 Specifications

4.1 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
I _{IK}	Input clamp current ⁽²⁾	For V _I < 0 V or V _I > V _{CC}		±20 mA
I _{OK}	Output clamp current ⁽²⁾	For V _O < 0 V 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				±50 mA
T _{stg}	Storage temperature range	-65	150	°C

- (1) 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 *recommended operating conditions* is not implied. 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.

4.2 Recommended Operating Conditions

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

		SN54HC393			SN74HC393			UNIT
		MIN	NOM	MAX	MIN	NOM	MAX	
V _{CC}	Supply voltage	2	5	6	2	5	6	V
V _{IH}	High-level input voltage	V _{CC} = 2 V		1.5	1.5		V	
		V _{CC} = 4.5 V		3.15	3.15			
		V _{CC} = 6 V		4.2	4.2			
V _{IL}	Low-level input voltage	V _{CC} = 2 V			0.5		0.5	V
		V _{CC} = 4.5 V			1.35		1.35	
		V _{CC} = 6 V			1.8		1.8	
V _I	Input voltage	0		V _{CC}	0		V _{CC}	V
V _O	Output voltage	0		V _{CC}	0		V _{CC}	V
Δt/Δv ⁽²⁾	Input transition rise/fall time	V _{CC} = 2 V			1000		1000	ns
		V _{CC} = 4.5 V			500		500	
		V _{CC} = 6 V			400		400	
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. Refer to the TI application report, *Implications of Slow or Floating CMOS Inputs*, literature number SCBA004.
- (2) If this device is used in the threshold region (from V_{ILmax} = 0.5 V to V_{IHmin} = 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_r = 1000 ns and V_{CC} = 2 V does not damage the device; however, functionally, the CLK inputs are not ensured while in the shift, count, or toggle operating modes.

4.3 Thermal Information

THERMAL METRIC ⁽¹⁾		SN74HC393						UNIT
		D (SOIC)	DB (SSOP)	DYY (SOT-23)	N (PDIP)	NS (SO)	PW (TSSOP)	
		14 PINS	14 PINS	14 PINS	14 PINS	14 PINS	14 PINS	
R _{θJA}	Junction-to-ambient thermal resistance	86	96	124.1	80	76	113	°C/W

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

4.4 Electrical Characteristics

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

PARAMETER	TEST CONDITIONS		V _{CC}	T _A = 25°C			SN54HC393		SN74HC393		UNIT	
				MIN	TYP	MAX	MIN	MAX	MIN	MAX		
V _{OH}	V _I = V _{IH} or V _{IL}	I _{OH} = -20 μA	2 V	1.9	1.998		1.9		1.9	V		
			4.5 V	4.4	4.499		4.4		4.4			
			6 V	5.9	5.999		5.9		5.9			
		I _{OH} = -4 mA	4.5 V	3.98	4.3		3.7		3.84			
			6 V	5.48	5.8		5.2		5.34			
V _{OL}	V _I = V _{IH} or V _{IL}	I _{OL} = 20 μA	2 V		0.002	0.1		0.1		V		
			4.5 V		0.001	0.1		0.1			0.1	
			6		0.001	0.1		0.1			0.1	
		I _{OL} = 4 mA	4.5 V		0.17	0.26		0.4			0.33	
			6 V		0.15	0.26		0.4			0.33	
I _I	V _I = V _{CC} or 0		6 V		±0.1	±100		±1000		±1000	nA	
I _{CC}	V _I = V _{CC} or 0		I _O = 0	6 V			8		160		80	μA
C _i			2 V to 6 V		3	10		10		10	pF	

4.5 Timing Requirements

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

PARAMETER		V _{CC}	T _A = 25°C		SN54HC393		SN74HC393		UNIT
			MIN	MAX	MIN	MAX	MIN	MAX	
f _{clock}	Clock frequency	2 V		6		4.2		5	MHz
		4.5 V		31		21		25	
		6 V		36		25		28	
t _w	Pulse duration	CLK high or low	2 V	80		120		100	ns
			4.5 V	16		24		20	
			6 V	14		20		18	
		CLR high	2 V	80		120		100	
			4.5 V	16		24		20	
			6 V	14		20		18	
t _{su}	Setup time, CLR inactive	2 V		25		25		25	ns
		4.5 V		5		5		5	
		6 V		5		5		5	

4.6 Switching Characteristics

over recommended operating free-air temperature range, $C_L = 50$ pF (unless otherwise noted) (Figure 5-1)

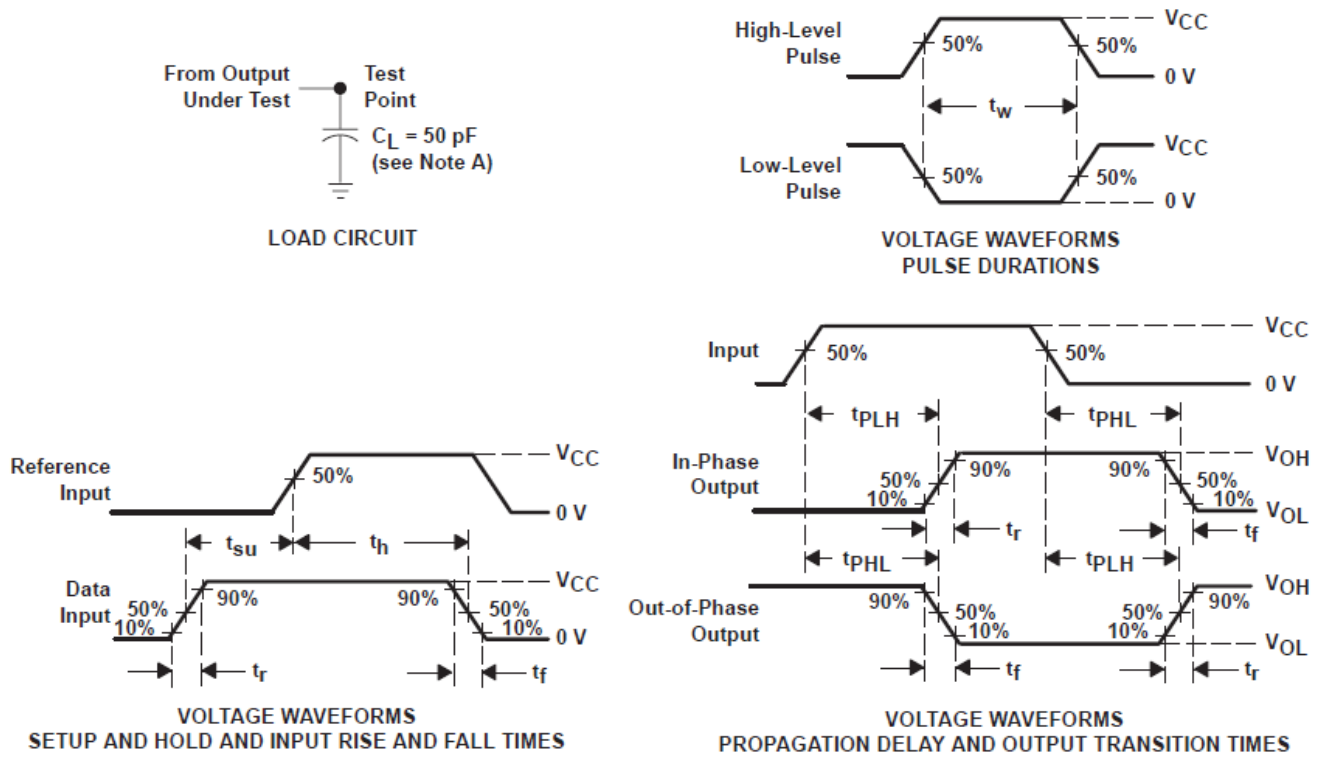
PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CC}	$T_A = 25^\circ\text{C}$			SN54HC393		SN74HC393		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
f_{max}	CLK	Q_A	2 V	6	10		4.2		5	MHz	
			4.5 V	31	50		21		25		
			6 V	36	60		25		28		
t_{pd}	CLK	Q_A	2 V		50	120		180		150	ns
			4.5 V		15	24		36		30	
			6 V		13	20		31		26	
		Q_B	2 V		72	190		285		240	
			4.5 V		22	38		57		47	
			6 V		18	32		48		40	
		Q_C	2 V		91	240		360		300	
			4.5 V		28	48		72		60	
			6 V		22	41		61		51	
		Q_D	2 V		100	290		430		360	
			4.5 V		32	58		87		72	
			6 V		24	50		74		62	
t_{PHL}	CLR	Any	2 V		45	165		250		205	
			4.5 V		17	33		49		41	
			6 V		14	28		42		35	
t_t		Any	2 V		28	75		110		95	
			4.5 V		8	15		22		19	
			6 V		6	13		19		16	

4.7 Operating Characteristics

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

PARAMETER		TEST CONDITIONS	TYP	UNIT
C_{PD}	Power dissipation capacitance	No load	40	pF

5 Parameter Measurement Information



- A. C_L includes probe and test-fixture 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.
- E. t_{PLH} and t_{PHL} are the same as t_{pd} .

Figure 5-1. Load Circuit and Voltage Waveforms

6 Detailed Description

6.1 Overview

The 'HC393 devices contain eight flip-flops and additional gating to implement two individual 4-bit counters in a single package. These devices comprise two independent 4-bit binary counters, each having a clear (CLR) and a clock (CLK) input. N-bit binary counters can be implemented with each package, providing the capability of divide by 256. The 'HC393 devices have parallel outputs from each counter stage so that any submultiple of the input count frequency is available for system timing signals.

6.2 Functional Block Diagram

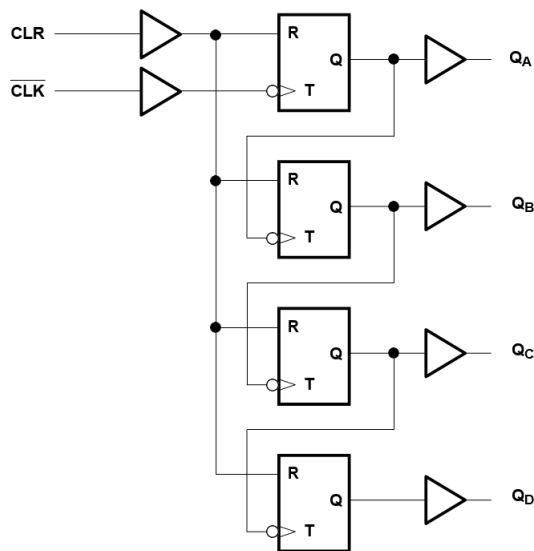


Figure 6-1. Logic Diagram, Each Counter (Positive Logic)

6.3 Device Functional Modes

**Table 6-1. Function Table Count Sequence
(Each Buffer)**

COUNT	OUTPUTS			
	Q _D	Q _C	Q _B	Q _A
0	L	L	L	L
1	L	L	L	H
2	L	L	H	L
3	L	L	H	H
4	L	H	L	L
5	L	H	L	H
6	L	H	H	L
7	L	H	H	H
8	H	L	L	L
9	H	L	L	H
10	H	L	H	L
11	H	L	H	H
12	H	H	L	L
13	H	H	L	H
14	H	H	H	L
15	H	H	H	H

7 Application and Implementation

Note

Information in the following applications sections is not part of the TI component specification, and TI does not warrant its accuracy or completeness. TI's customers are responsible for determining suitability of components for their purposes, as well as validating and testing their design implementation to confirm system functionality.

7.1 Power Supply Recommendations

The power supply can be any voltage between the minimum and maximum supply voltage rating located in the *Recommended Operating Conditions*. Each V_{CC} terminal should have a good bypass capacitor to prevent power disturbance. A $0.1\mu\text{F}$ capacitor is recommended for this device. It is acceptable to parallel multiple bypass capacitors to reject different frequencies of noise. The $0.1\mu\text{F}$ and $1\mu\text{F}$ capacitors are commonly used in parallel. The bypass capacitor should be installed as close to the power terminal as possible for best results.

7.2 Layout

7.2.1 Layout Guidelines

- Bypass capacitor placement
 - Place near the positive supply terminal of the device
 - Provide an electrically short ground return path
 - Use wide traces to minimize impedance
 - Keep the device, capacitors, and traces on the same side of the board whenever possible
- Signal trace geometry
 - 8mil to 12mil trace width
 - Lengths less than 12cm to minimize transmission line effects
 - Avoid 90° corners for signal traces
 - Use an unbroken ground plane below signal traces
 - Flood fill areas around signal traces with ground
 - For traces longer than 12cm
 - Use impedance controlled traces
 - Source-terminate using a series damping resistor near the output
 - Avoid branches; buffer signals that must branch separately

7.2.2 Layout Example

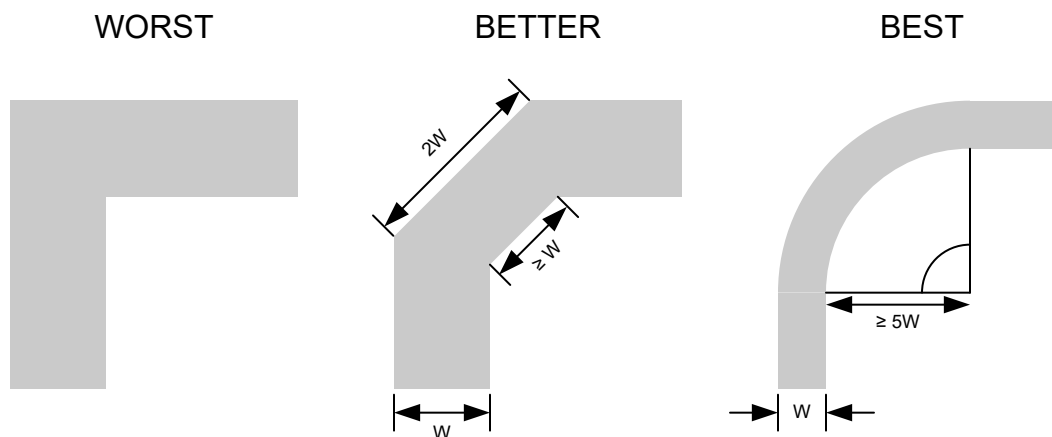


Figure 7-1. Example Trace Corners for Improved Signal Integrity

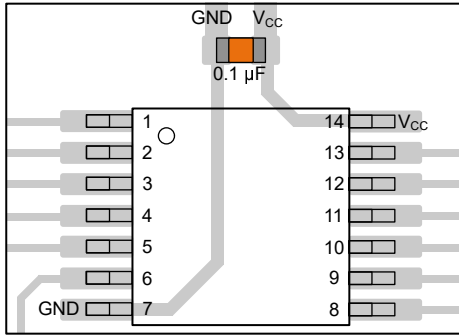


Figure 7-2. Example Bypass Capacitor Placement for TSSOP and Similar Packages

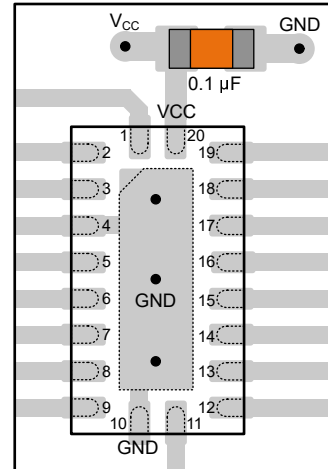


Figure 7-3. Example Bypass Capacitor Placement for WQFN and Similar Packages

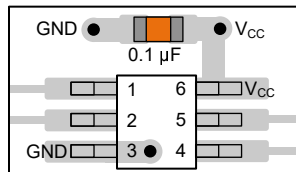


Figure 7-4. Example Bypass Capacitor Placement for SOT, SC70 and Similar Packages

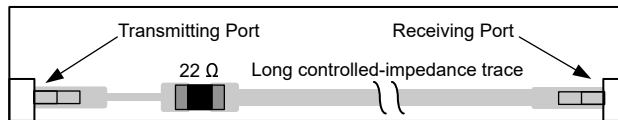


Figure 7-5. Example Damping Resistor Placement for Improved Signal Integrity

8 Device and Documentation Support

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.

8.1 Documentation Support

8.1.1 Related Documentation

8.2 Receiving Notification of Documentation Updates

To receive notification of documentation updates, navigate to the device product folder on ti.com. Click on *Notifications* to register and receive a weekly digest of any product information that has changed. For change details, review the revision history included in any revised document.

8.3 Support Resources

[TI E2E™ support forums](#) are an engineer's go-to source for fast, verified answers and design help — straight from the experts. Search existing answers or ask your own question to get the quick design help you need.

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8.4 Trademarks

TI E2E™ is a trademark of Texas Instruments.

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8.5 Electrostatic Discharge Caution



This integrated circuit can be damaged by ESD. Texas Instruments recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage.

ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

8.6 Glossary

[TI Glossary](#) This glossary lists and explains terms, acronyms, and definitions.

9 Revision History

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

Changes from Revision D (July 2003) to Revision E (December 2024)	Page
• Added <i>Device Information</i> table, <i>Pin Functions</i> table, <i>Thermal Information</i> table, <i>Device Functional Modes</i> , Application and Implementation section, <i>Device and Documentation Support</i> section, and <i>Mechanical, Packaging, and Orderable Information</i> section.....	1
• Added DYY package to <i>Device Information</i> table, <i>Pin Functions and Configuration</i> section, and <i>Thermal Information</i> table.....	1

10 Mechanical, Packaging, and Orderable Information

The following pages include mechanical, packaging, and orderable information. This information is the most current data available for the designated devices. This data is subject to change without notice and revision of this document. For browser-based versions of this data sheet, refer to the left-hand navigation.

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
84100012A	ACTIVE	LCCC	FK	20	55	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	84100012A SNJ54HC 393FK	Samples
8410001CA	ACTIVE	CDIP	J	14	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	8410001CA SNJ54HC393J	Samples
8410001DA	ACTIVE	CFP	W	14	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	8410001DA SNJ54HC393W	Samples
JM38510/66309BCA	ACTIVE	CDIP	J	14	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	JM38510/ 66309BCA	Samples
M38510/66309BCA	ACTIVE	CDIP	J	14	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	JM38510/ 66309BCA	Samples
SN54HC393J	ACTIVE	CDIP	J	14	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	SN54HC393J	Samples
SN74HC393D	OBSOLETE	SOIC	D	14		TBD	Call TI	Call TI	-40 to 85	HC393	
SN74HC393DBR	ACTIVE	SSOP	DB	14	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC393	Samples
SN74HC393DR	ACTIVE	SOIC	D	14	2500	RoHS & Green	NIPDAU SN	Level-1-260C-UNLIM	-40 to 85	HC393	Samples
SN74HC393DT	OBSOLETE	SOIC	D	14		TBD	Call TI	Call TI	-40 to 85	HC393	
SN74HC393N	ACTIVE	PDIP	N	14	25	RoHS & Green	NIPDAU	N / A for Pkg Type	-40 to 85	SN74HC393N	Samples
SN74HC393NSR	ACTIVE	SOP	NS	14	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC393	Samples
SN74HC393PW	OBSOLETE	TSSOP	PW	14		TBD	Call TI	Call TI	-40 to 85	HC393	
SN74HC393PWR	ACTIVE	TSSOP	PW	14	2000	RoHS & Green	NIPDAU SN	Level-1-260C-UNLIM	-40 to 85	HC393	Samples
SN74HC393PWT	OBSOLETE	TSSOP	PW	14		TBD	Call TI	Call TI	-40 to 85	HC393	
SN74HCS393DYYR	ACTIVE	SOT-23-THIN	DYY	14	3000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 125	HCS393	Samples
SNJ54HC393FK	ACTIVE	LCCC	FK	20	55	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	84100012A SNJ54HC 393FK	Samples
SNJ54HC393J	ACTIVE	CDIP	J	14	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	8410001CA SNJ54HC393J	Samples

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
SNJ54HC393W	ACTIVE	CFP	W	14	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	8410001DA SNJ54HC393W	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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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 SN54HC393, SN74HC393 :

- Catalog : [SN74HC393](#)
- Military : [SN54HC393](#)

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
SN74HC393DBR	SSOP	DB	14	2000	330.0	16.4	8.35	6.6	2.4	12.0	16.0	Q1
SN74HC393DR	SOIC	D	14	2500	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1
SN74HC393DR	SOIC	D	14	2500	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1
SN74HC393NSR	SOP	NS	14	2000	330.0	16.4	8.2	10.5	2.5	12.0	16.0	Q1
SN74HC393NSR	SOP	NS	14	2000	330.0	16.4	8.45	10.55	2.5	12.0	16.2	Q1
SN74HC393PWR	TSSOP	PW	14	2000	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1
SN74HC393PWR	TSSOP	PW	14	2000	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1
SN74HCS393DYYR	SOT-23-THIN	DYY	14	3000	330.0	12.4	4.8	3.6	1.6	8.0	12.0	Q3

TAPE AND REEL BOX DIMENSIONS


*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74HC393DBR	SSOP	DB	14	2000	356.0	356.0	35.0
SN74HC393DR	SOIC	D	14	2500	356.0	356.0	35.0
SN74HC393DR	SOIC	D	14	2500	356.0	356.0	35.0
SN74HC393NSR	SOP	NS	14	2000	367.0	367.0	38.0
SN74HC393NSR	SOP	NS	14	2000	356.0	356.0	35.0
SN74HC393PWR	TSSOP	PW	14	2000	356.0	356.0	35.0
SN74HC393PWR	TSSOP	PW	14	2000	356.0	356.0	35.0
SN74HCS393DYR	SOT-23-THIN	DYY	14	3000	336.6	336.6	31.8

TUBE


*All dimensions are nominal

Device	Package Name	Package Type	Pins	SPQ	L (mm)	W (mm)	T (μm)	B (mm)
84100012A	FK	LCCC	20	55	506.98	12.06	2030	NA
8410001DA	W	CFP	14	25	506.98	26.16	6220	NA
SN74HC393N	N	PDIP	14	25	506	13.97	11230	4.32
SN74HC393N	N	PDIP	14	25	506	13.97	11230	4.32
SNJ54HC393FK	FK	LCCC	20	55	506.98	12.06	2030	NA
SNJ54HC393W	W	CFP	14	25	506.98	26.16	6220	NA

W (R-GDFP-F14)

CERAMIC DUAL FLATPACK



- NOTES:
- A. All linear dimensions are in inches (millimeters).
 - B. This drawing is subject to change without notice.
 - C. This package can be hermetically sealed with a ceramic lid using glass frit.
 - D. Index point is provided on cap for terminal identification only.
 - E. Falls within MIL STD 1835 GDFP1-F14

DB0014A



PACKAGE OUTLINE

SSOP - 2 mm max height

SMALL OUTLINE PACKAGE



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

DB0014A

SSOP - 2 mm max height

SMALL OUTLINE PACKAGE



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE: 10X



4220762/A 05/2024

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

DB0014A

SSOP - 2 mm max height

SMALL OUTLINE PACKAGE



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

4220762/A 05/2024

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.

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 14

GENERIC PACKAGE VIEW
CDIP - 5.08 mm max height
CERAMIC DUAL IN LINE PACKAGE



Images above are just a representation of the package family, actual package may vary.
Refer to the product data sheet for package details.

4040083-5/G

J0014A



PACKAGE OUTLINE

CDIP - 5.08 mm max height

CERAMIC DUAL IN LINE PACKAGE



4214771/A 05/2017

NOTES:

1. All controlling linear dimensions are in inches. Dimensions in brackets are in millimeters. Any dimension in brackets or parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This package is hermetically sealed with a ceramic lid using glass frit.
4. Index point is provided on cap for terminal identification only and on press ceramic glass frit seal only.
5. Falls within MIL-STD-1835 and GDIP1-T14.

EXAMPLE BOARD LAYOUT

J0014A

CDIP - 5.08 mm max height

CERAMIC DUAL IN LINE PACKAGE



LAND PATTERN EXAMPLE
NON-SOLDER MASK DEFINED
SCALE: 5X



4214771/A 05/2017

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



4220202/B 12/2023

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

PW0014A

TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE: 10X



4220202/B 12/2023

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

PW0014A

TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE



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

4220202/B 12/2023

NOTES: (continued)

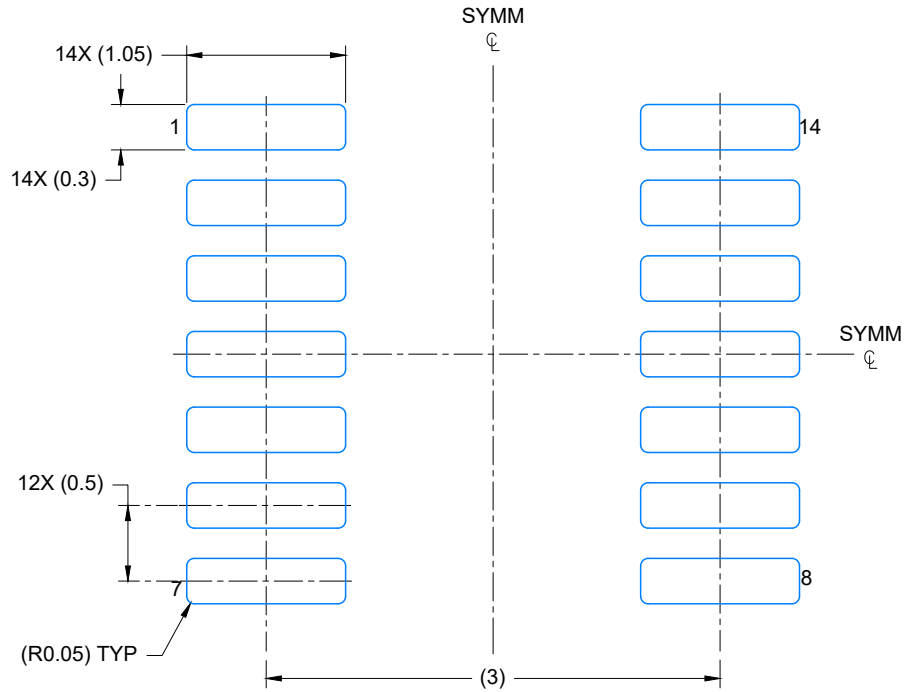
8. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
9. Board assembly site may have different recommendations for stencil design.



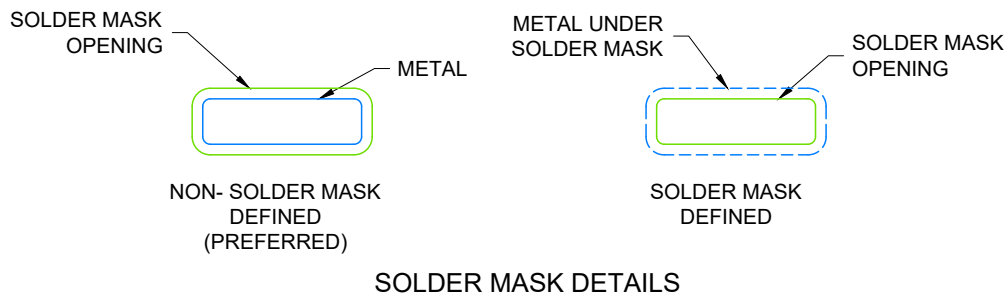
4224643/D 07/2024

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 per side.
4. This dimension does not include interlead flash. Interlead flash shall not exceed 0.50 per side.
5. Reference JEDEC Registration MO-345, Variation AB



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE: 20X



4224643/D 07/2024

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.



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.



D0014A

PACKAGE OUTLINE

SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT



4220718/A 09/2016

NOTES:

1. All linear dimensions are in millimeters. Dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 mm, per side.
4. This dimension does not include interlead flash. Interlead flash shall not exceed 0.43 mm, per side.
5. Reference JEDEC registration MS-012, variation AB.

EXAMPLE BOARD LAYOUT

D0014A

SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT



LAND PATTERN EXAMPLE
SCALE:8X



SOLDER MASK DETAILS

4220718/A 09/2016

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

D0014A

SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT



SOLDER PASTE EXAMPLE
BASED ON 0.125 mm THICK STENCIL
SCALE:8X

4220718/A 09/2016

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.

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.

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