



**THE DATASHEET OF  
CD74HC390M96**



September 1997 - Revised October 2003

## High-Speed CMOS Logic Dual Decade Ripple Counter

### Features

- Two BCD Decade or Bi-Quinary Counters
- One Package Can Be Configured to Divide-by-2, 4, 5, 10, 20, 25, 50 or 100
- Two Master Reset Inputs to Clear Each Decade Counter Individually
- Fanout (Over Temperature Range)
  - Standard Outputs . . . . . 10 LSTTL Loads
  - Bus Driver Outputs . . . . . 15 LSTTL Loads
- Wide Operating Temperature Range . . . -55°C to 125°C
- Balanced Propagation Delay and Transition Times
- Significant Power Reduction Compared to LSTTL Logic ICs
- HC Types
  - 2V to 6V Operation
  - High Noise Immunity:  $N_{IL} = 30\%$ ,  $N_{IH} = 30\%$  of  $V_{CC}$  at  $V_{CC} = 5V$
- HCT Types
  - 4.5V to 5.5V Operation
  - Direct LSTTL Input Logic Compatibility,  $V_{IL} = 0.8V$  (Max),  $V_{IH} = 2V$  (Min)
  - CMOS Input Compatibility,  $I_I \leq 1\mu A$  at  $V_{OL}$ ,  $V_{OH}$

### Description

The CD74HC390 and 'HCT390 dual 4-bit decade ripple counters are high-speed silicon-gate CMOS devices and are pin compatible with low-power Schottky TTL (LSTTL). These devices are divided into four separately clocked sections. The counters have two divide-by-2 sections and two divide-by-5 sections. These sections are normally used in a BCD decade or bi-quinary configuration, since they share a common master reset (nMR). If the two master reset inputs (1MR and 2MR) are used to simultaneously clear all 8 bits of the counter, a number of counting configurations are possible within one package. The separate clock inputs (nCP0 and nCP1) of each section allow ripple counter or frequency division applications of divide-by-2, 4, 5, 10, 20, 25, 50 or 100. Each section is triggered by the High-to-Low transition of the input pulses (nCP0 and nCP1).

For BCD decade operation, the nQ0 output is connected to the nCP1 input of the divide-by-5 section. For bi-quinary decade operation, the nO3 output is connected to the nCP0 input and nQ0 becomes the decade output.

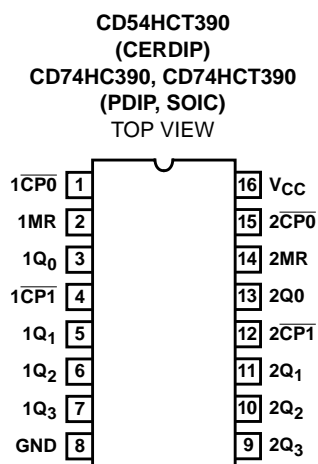
The master reset inputs (1MR and 2MR) are active-High asynchronous inputs to each decade counter which operates on the portion of the counter identified by the "1" and "2" prefixes in the pin configuration. A High level on the nMR input overrides the clock and sets the four outputs Low.

### Ordering Information

PART NUMBER	TEMP. RANGE (°C)	PACKAGE
CD54HCT390F3A	-55 to 125	16 Ld CERDIP
CD74HC390E	-55 to 125	16 Ld PDIP
CD74HC390M	-55 to 125	16 Ld SOIC
CD74HC390MT	-55 to 125	16 Ld SOIC
CD74HC390M96	-55 to 125	16 Ld SOIC
CD74HCT390E	-55 to 125	16 Ld PDIP
CD74HCT390M	-55 to 125	16 Ld SOIC
CD74HCT390MT	-55 to 125	16 Ld SOIC
CD74HCT390M96	-55 to 125	16 Ld SOIC

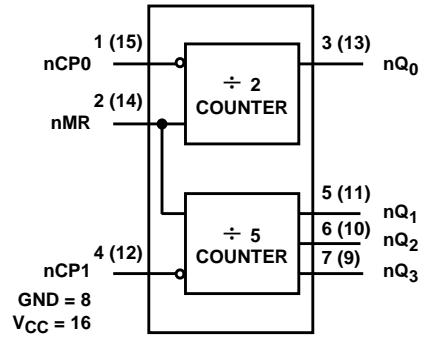
NOTE: When ordering, use the entire part number. The suffix 96 denotes tape and reel. The suffix T denotes a small-quantity reel of 250.

### Pinout



**CD74HC390, CD54HCT390, CD74HCT390**

**Functional Diagram**



**TRUTH TABLE**

INPUTS		ACTION
CP	MR	
↑	L	No Change
↓	L	Count
X	H	All Qs Low

H = High Voltage Level, L = Low Voltage Level, X = Don't Care,  
 ↑ = Transition from Low to High Level, ↓ = Transition from High to Low.

**BCD COUNT SEQUENCE FOR 1/2 THE 390**

COUNT	OUTPUTS			
	Q0	Q1	Q2	Q3
0	L	L	L	L
1	H	L	L	L
2	L	H	L	L
3	H	H	L	L
4	L	L	H	L
5	H	L	H	L
6	L	H	H	L
7	H	H	H	L
8	L	L	L	H
9	H	L	L	H

Output nQ0 connected to nCP1 with counter input on nCP0.

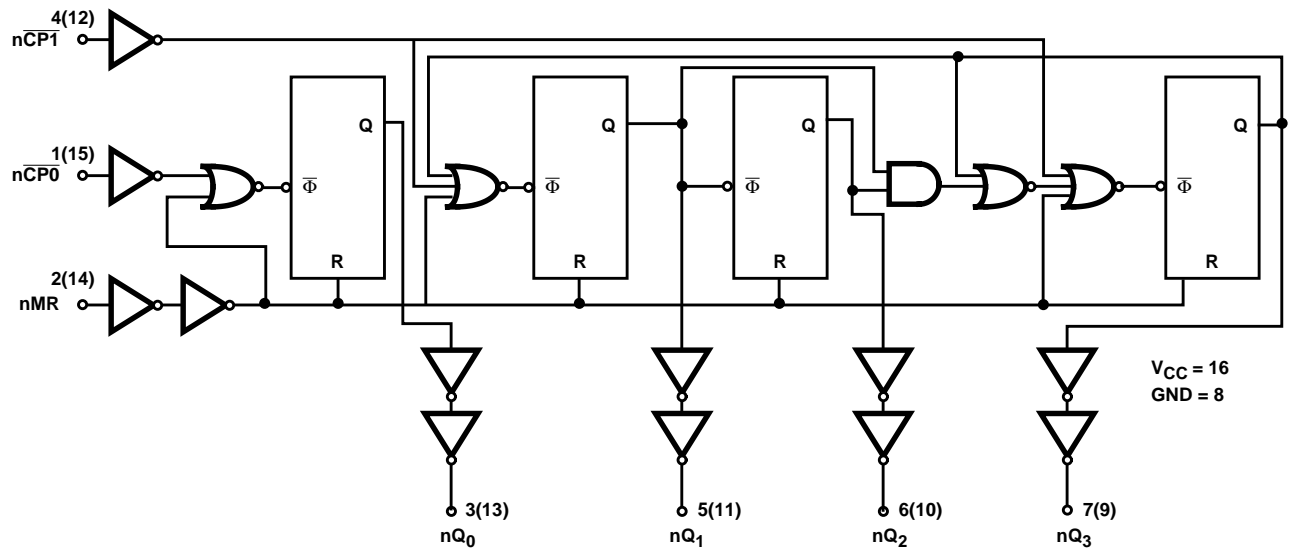
**B-QUINARY COUNT SEQUENCE FOR 1/2 THE 390**

COUNT	OUTPUTS			
	Q0	Q1	Q2	Q3
0	L	L	L	L
1	L	H	L	L
2	L	L	H	L
3	L	H	H	L
4	L	L	L	H
5	H	L	L	L
6	H	H	H	L
7	H	L	H	L
8	H	H	H	L
9	H	L	L	H

Output nQ3 connected to nCP0 with counter input on nCP1.

CD74HC390, CD54HCT390, CD74HCT390

Logic Diagram



# CD74HC390, CD54HCT390, CD74HCT390

## Absolute Maximum Ratings

DC Supply Voltage, $V_{CC}$ .....	-0.5V to 7V
DC Input Diode Current, $I_{IK}$	
For $V_I < -0.5V$ or $V_I > V_{CC} + 0.5V$ .....	$\pm 20mA$
DC Output Diode Current, $I_{OK}$	
For $V_O < -0.5V$ or $V_O > V_{CC} + 0.5V$ .....	$\pm 20mA$
DC Output Source or Sink Current per Output Pin, $I_O$	
For $V_O > -0.5V$ or $V_O < V_{CC} + 0.5V$ .....	$\pm 25mA$
DC $V_{CC}$ or Ground Current, $I_{CC}$ or $I_{GND}$ .....	$\pm 50mA$

## Thermal Information

Thermal Resistance (Typical, Note 1)	$\theta_{JA}$ (°C/W)
E (PDIP) Package .....	67
M (SOIC) Package .....	73
Maximum Junction Temperature .....	150°C
Maximum Storage Temperature Range .....	-65°C to 150°C
Maximum Lead Temperature (Soldering 10s) .....	300°C (SOIC - Lead Tips Only)

## Operating Conditions

Temperature Range ( $T_A$ ) .....	-55°C to 125°C
Supply Voltage Range, $V_{CC}$	
HC Types .....	.2V to 6V
HCT Types .....	.4.5V to 5.5V
DC Input or Output Voltage, $V_I$ , $V_O$ .....	0V to $V_{CC}$
Input Rise and Fall Time	
2V .....	1000ns (Max)
4.5V .....	500ns (Max)
6V .....	400ns (Max)

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

### NOTE:

1. The package thermal impedance is calculated in accordance with JESD 51-7.

## DC Electrical Specifications

PARAMETER	SYMBOL	TEST CONDITIONS		$V_{CC}$ (V)	25°C			-40°C TO 85°C		-55°C TO 125°C		UNITS
		$V_I$ (V)	$I_O$ (mA)		MIN	TYP	MAX	MIN	MAX	MIN	MAX	
<b>HC TYPES</b>												
High Level Input Voltage	$V_{IH}$	-	-	2	1.5	-	-	1.5	-	1.5	-	V
				4.5	3.15	-	-	3.15	-	3.15	-	V
				6	4.2	-	-	4.2	-	4.2	-	V
Low Level Input Voltage	$V_{IL}$	-	-	2	-	-	0.5	-	0.5	-	0.5	V
				4.5	-	-	1.35	-	1.35	-	1.35	V
				6	-	-	1.8	-	1.8	-	1.8	V
High Level Output Voltage CMOS Loads	$V_{OH}$	$V_{IH}$ or $V_{IL}$	-0.02	2	1.9	-	-	1.9	-	1.9	-	V
			-0.02	4.5	4.4	-	-	4.4	-	4.4	-	V
			-0.02	6	5.9	-	-	5.9	-	5.9	-	V
High Level Output Voltage TTL Loads	$V_{OH}$	$V_{IH}$ or $V_{IL}$	-	-	-	-	-	-	-	-	-	V
			-4	4.5	3.98	-	-	3.84	-	3.7	-	V
			-5.2	6	5.48	-	-	5.34	-	5.2	-	V
Low Level Output Voltage CMOS Loads	$V_{OL}$	$V_{IH}$ or $V_{IL}$	0.02	2	-	-	0.1	-	0.1	-	0.1	V
			0.02	4.5	-	-	0.1	-	0.1	-	0.1	V
			0.02	6	-	-	0.1	-	0.1	-	0.1	V
Low Level Output Voltage TTL Loads	$V_{OL}$	$V_{IH}$ or $V_{IL}$	-	-	-	-	-	-	-	-	-	V
			4	4.5	-	-	0.26	-	0.33	-	0.4	V
			5.2	6	-	-	0.26	-	0.33	-	0.4	V
Input Leakage Current	$I_I$	$V_{CC}$ or GND	-	6	-	-	$\pm 0.1$	-	$\pm 1$	-	$\pm 1$	$\mu A$
Quiescent Device Current	$I_{CC}$	$V_{CC}$ or GND	0	6	-	-	8	-	80	-	160	$\mu A$

**CD74HC390, CD54HCT390, CD74HCT390**

**DC Electrical Specifications (Continued)**

PARAMETER	SYMBOL	TEST CONDITIONS		V <sub>CC</sub> (V)	25°C			-40°C TO 85°C		-55°C TO 125°C		UNITS
		V <sub>I</sub> (V)	I <sub>O</sub> (mA)		MIN	TYP	MAX	MIN	MAX	MIN	MAX	
<b>HCT TYPES</b>												
High Level Input Voltage	V <sub>IH</sub>	-	-	4.5 to 5.5	2	-	-	2	-	2	-	V
Low Level Input Voltage	V <sub>IL</sub>	-	-	4.5 to 5.5	-	-	0.8	-	0.8	-	0.8	V
High Level Output Voltage CMOS Loads	V <sub>OH</sub>	V <sub>IH</sub> or V <sub>IL</sub>	-0.02	4.5	4.4	-	-	4.4	-	4.4	-	V
High Level Output Voltage TTL Loads			-4	4.5	3.98	-	-	3.84	-	3.7	-	V
Low Level Output Voltage CMOS Loads	V <sub>OL</sub>	V <sub>IH</sub> or V <sub>IL</sub>	0.02	4.5	-	-	0.1	-	0.1	-	0.1	V
Low Level Output Voltage TTL Loads			4	4.5	-	-	0.26	-	0.33	-	0.4	V
Input Leakage Current	I <sub>I</sub>	V <sub>CC</sub> and GND	0	5.5	-	-	±0.1	-	±1	-	±1	μA
Quiescent Device Current	I <sub>CC</sub>	V <sub>CC</sub> or GND	0	5.5	-	-	8	-	80	-	160	μA
Additional Quiescent Device Current Per Input Pin: 1 Unit Load	ΔI <sub>CC</sub> (Note 2)	V <sub>CC</sub> -2.1	-	4.5 to 5.5	-	100	360	-	450	-	490	μA

NOTE:

- For dual-supply systems theoretical worst case (V<sub>I</sub> = 2.4V, V<sub>CC</sub> = 5.5V) specification is 1.8mA.

**HCT Input Loading Table**

INPUT	UNIT LOADS
nCP0	0.45
nCP1, MR	0.6

NOTE: Unit Load is ΔI<sub>CC</sub> limit specified in DC Electrical Table, e.g., 360μA max at 25°C.

**Prerequisite for Switching Specifications**

CHARACTERISTIC	SYMBOL	V <sub>CC</sub> (V)	25°C			-40°C TO 85°C		-55°C TO 125°C		UNITS
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
<b>HC TYPES</b>										
Maximum Clock Frequency	f <sub>MAX</sub>	2	6	-	-	5	-	4	-	MHz
		4.5	30	-	-	24	-	20	-	MHz
		6	35	-	-	28	-	24	-	MHz
Clock Pulse Width, nCP0, nCP1	t <sub>w</sub>	2	80	-	-	100	-	120	-	ns
		4.5	16	-	-	20	-	24	-	ns
		6	14	-	-	17	-	20	-	ns

**CD74HC390, CD54HCT390, CD74HCT390**

**Prerequisite for Switching Specifications (Continued)**

CHARACTERISTIC	SYMBOL	V <sub>CC</sub> (V)	25°C			-40°C TO 85°C		-55°C TO 125°C		UNITS
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
Reset Removal Time	t <sub>REM</sub>	2	70	-	-	90	-	105	-	ns
		4.5	14	-	-	18	-	21	-	ns
		6	12	-	-	15	-	18	-	ns
Reset Pulse Width	t <sub>W</sub>	2	50	-	-	65	-	75	-	ns
		4.5	10	-	-	13	-	15	-	ns
		6	9	-	-	11	-	13	-	ns

**HCT TYPES**

Maximum Clock Frequency	f <sub>MAX</sub>	4.5	27	-	-	22	-	18	-	MHz
Clock Pulse Width, nCP0, nCP1	t <sub>W</sub>	4.5	19	-	-	24	-	29	-	ns
Reset Removal Time	t <sub>REM</sub>	4.5	15	-	-	19	-	22	-	ns
Reset Pulse Width	t <sub>W</sub>	4.5	13	-	-	16	-	20	-	ns

**Switching Specifications** Input t<sub>r</sub>, t<sub>f</sub> = 6ns

PARAMETER	SYMBOL	TEST CONDITIONS	V <sub>CC</sub> (V)	25°C			-40°C TO 85°C		-55°C TO 125°C		UNITS
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
<b>HC TYPES</b>											
Propagation Delay (Figure 1) nCP0 to nQ0	t <sub>PLH</sub> , t <sub>PHL</sub>	C <sub>L</sub> = 50pF	2	-	-	175	-	220	-	265	ns
			4.5	-	-	35	-	44	-	53	ns
		C <sub>L</sub> = 15pF	5	-	14	-	-	-	-	-	ns
		C <sub>L</sub> = 50pF	6	-	-	30	-	37	-	45	ns
nCP1 to nQ1	t <sub>PLH</sub> , t <sub>PHL</sub>	C <sub>L</sub> = 50pF	2	-	-	185	-	230	-	280	ns
			4.5	-	-	37	-	46	-	56	ns
			6	-	-	31	-	39	-	48	ns
nCP1 to nQ2	t <sub>PLH</sub> , t <sub>PHL</sub>	C <sub>L</sub> = 50pF	2	-	-	245	-	305	-	370	ns
			4.5	-	-	49	-	61	-	74	ns
			6	-	-	42	-	52	-	63	ns
nCP1 to nQ3	t <sub>PLH</sub> , t <sub>PHL</sub>	C <sub>L</sub> = 50pF	2	-	-	180	-	225	-	270	ns
			4.5	-	-	36	-	45	-	54	ns
			5	-	15	-	-	-	-	-	ns
			6	-	-	31	-	38	-	46	ns
nCP0 to nQ3 (nQ0 connected to nCP1)	t <sub>PLH</sub> , t <sub>PHL</sub>	C <sub>L</sub> = 50pF	2	-	-	365	-	455	-	550	ns
			4.5	-	-	73	-	91	-	110	ns
			6	-	-	62	-	77	-	94	ns
MR to Q <sub>n</sub>	t <sub>PLH</sub> , t <sub>PHL</sub>	C <sub>L</sub> = 50pF	2	-	-	190	-	240	-	285	ns
			4.5	-	-	38	-	48	-	57	ns
		C <sub>L</sub> = 15pF	5	-	16	-	-	-	-	-	ns
		C <sub>L</sub> = 50pF	6	-	-	32	-	41	-	48	ns

## CD74HC390, CD54HCT390, CD74HCT390

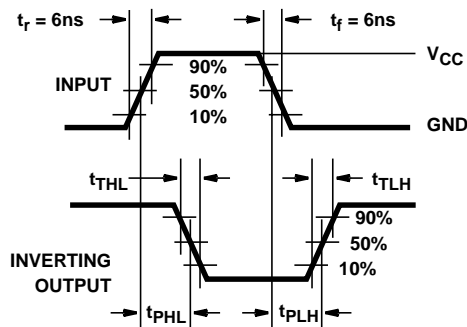
### Switching Specifications Input $t_r, t_f = 6\text{ns}$ (Continued)

PARAMETER	SYMBOL	TEST CONDITIONS	$V_{CC}$ (V)	25°C			-40°C TO 85°C		-55°C TO 125°C		UNITS
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
Output Transition Time (Figure 1)	$t_{TLH}, t_{THL}$	$C_L = 50\text{pF}$	2	-	-	75	-	95	-	110	ns
			4.5	-	-	15	-	19	-	22	ns
			6	-	-	13	-	16	-	19	ns
Input Capacitance	$C_{IN}$	$C_L = 50\text{pF}$	-	-	-	10	-	10	-	10	pF
Power Dissipation Capacitance (Notes 3, 4)	$C_{PD}$	$C_L = 15\text{pF}$	5	-	28	-	-	-	-	-	pF
<b>HCT TYPES</b>											
Propagation Delay (Figure 1) $n\overline{CP0}$ to $nQ_0$	$t_{PLH}, t_{PHL}$	$C_L = 50\text{pF}$	4.5	-	-	40	-	50	-	60	ns
		$C_L = 15\text{pF}$	5	-	17	-	-	-	-	-	ns
$n\overline{CP1}$ to $nQ_1$	$t_{PLH}, t_{PHL}$	$C_L = 50\text{pF}$	4.5	-	-	43	-	51	-	65	ns
$n\overline{CP1}$ to $nQ_2$	$t_{PLH}, t_{PHL}$	$C_L = 50\text{pF}$	4.5	-	-	55	-	69	-	83	ns
$n\overline{CP1}$ to $nQ_3$	$t_{PLH}, t_{PHL}$	$C_L = 50\text{pF}$	4.5	-	-	42	-	53	-	63	ns
		$C_L = 15\text{pF}$	5	-	18	-	-	-	-	-	ns
$n\overline{CP0}$ to $nQ_2$ ( $nQ_0$ connected to $n\overline{CP1}$ )	$t_{PLH}, t_{PHL}$	$C_L = 50\text{pF}$	4.5	-	-	84	-	105	-	126	ns
MR to $Q_n$	$t_{PLH}, t_{PHL}$	$C_L = 50\text{pF}$	4.5	-	-	42	-	53	-	63	ns
		$C_L = 15\text{pF}$	5	-	18	-	-	-	-	-	ns
Output Transition	$t_{TLH}, t_{THL}$	$C_L = 50\text{pF}$	4.5	-	-	15	-	19	-	22	ns
Input Capacitance	$C_{IN}$	$C_L = 15\text{pF}$	-	-	-	10	-	10	-	10	pF
Power Dissipation Capacitance (Notes 3, 4)	$C_{PD}$	$C_L = 15\text{pF}$	5	-	32	-	-	-	-	-	pF

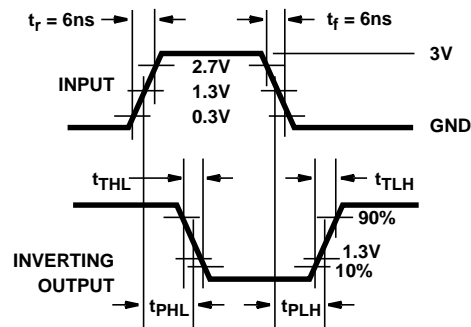
**NOTES:**

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

### Test Circuits and Waveforms



**FIGURE 1. HC AND HCU TRANSITION TIMES AND PROPAGATION DELAY TIMES, COMBINATION LOGIC**



**FIGURE 2. HCT TRANSITION TIMES AND PROPAGATION DELAY TIMES, COMBINATION LOGIC**

**PACKAGING INFORMATION**

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
5962-9098401MEA	ACTIVE	CDIP	J	16	1	TBD	A42	N / A for Pkg Type	-55 to 125	5962-9098401MEA A CD54HCT390F3A	<a href="#">Samples</a>
CD54HCT390F3A	ACTIVE	CDIP	J	16	1	TBD	A42	N / A for Pkg Type	-55 to 125	5962-9098401MEA A CD54HCT390F3A	<a href="#">Samples</a>
CD74HC390E	ACTIVE	PDIP	N	16	25	Green (RoHS & no Sb/Br)	CU NIPDAU	N / A for Pkg Type	-55 to 125	CD74HC390E	<a href="#">Samples</a>
CD74HC390EE4	ACTIVE	PDIP	N	16	25	Green (RoHS & no Sb/Br)	CU NIPDAU	N / A for Pkg Type	-55 to 125	CD74HC390E	<a href="#">Samples</a>
CD74HC390M	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-55 to 125	HC390M	<a href="#">Samples</a>
CD74HC390M96	ACTIVE	SOIC	D	16	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-55 to 125	HC390M	<a href="#">Samples</a>
CD74HCT390E	ACTIVE	PDIP	N	16	25	Green (RoHS & no Sb/Br)	CU NIPDAU	N / A for Pkg Type	-55 to 125	CD74HCT390E	<a href="#">Samples</a>
CD74HCT390EE4	ACTIVE	PDIP	N	16	25	Green (RoHS & no Sb/Br)	CU NIPDAU	N / A for Pkg Type	-55 to 125	CD74HCT390E	<a href="#">Samples</a>
CD74HCT390M	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-55 to 125	HCT390M	<a href="#">Samples</a>
CD74HCT390M96	ACTIVE	SOIC	D	16	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-55 to 125	HCT390M	<a href="#">Samples</a>
CD74HCT390MT	ACTIVE	SOIC	D	16	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-55 to 125	HCT390M	<a href="#">Samples</a>

(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.

**OBSELETE:** 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.

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

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

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

(5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

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

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**OTHER QUALIFIED VERSIONS OF CD54HCT390, CD74HCT390 :**

● Catalog: [CD74HCT390](#)

● Military: [CD54HCT390](#)

NOTE: Qualified Version Definitions:

● Catalog - TI's standard catalog product

● Military - QML certified for Military and Defense Applications

**TAPE AND REEL INFORMATION**



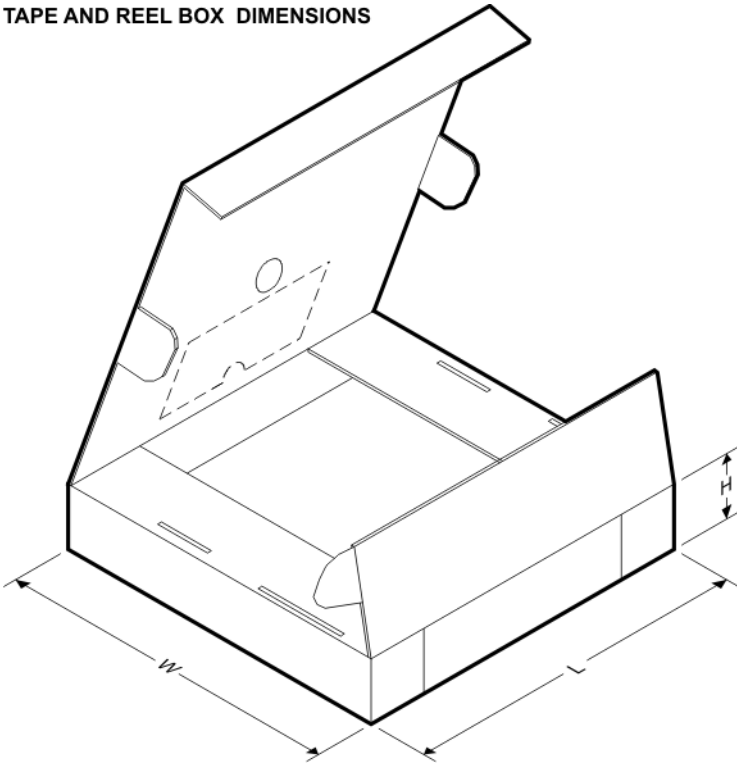
**QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE**



\*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
CD74HC390M96	SOIC	D	16	2500	330.0	16.4	6.5	10.3	2.1	8.0	16.0	Q1
CD74HCT390M96	SOIC	D	16	2500	330.0	16.4	6.5	10.3	2.1	8.0	16.0	Q1

**TAPE AND REEL BOX DIMENSIONS**



\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
CD74HC390M96	SOIC	D	16	2500	333.2	345.9	28.6
CD74HCT390M96	SOIC	D	16	2500	333.2	345.9	28.6

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.

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.
  -  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.

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.

J (R-GDIP-T\*\*)

14 LEADS SHOWN

CERAMIC DUAL IN-LINE PACKAGE



DIM \ PINS **	14	16	18	20
A	0.300 (7,62) BSC	0.300 (7,62) BSC	0.300 (7,62) BSC	0.300 (7,62) BSC
B MAX	0.785 (19,94)	.840 (21,34)	0.960 (24,38)	1.060 (26,92)
B MIN	—	—	—	—
C MAX	0.300 (7,62)	0.300 (7,62)	0.310 (7,87)	0.300 (7,62)
C MIN	0.245 (6,22)	0.245 (6,22)	0.220 (5,59)	0.245 (6,22)



4040083/F 03/03

- NOTES:
- All linear dimensions are in inches (millimeters).
  - This drawing is subject to change without notice.
  - This package is hermetically sealed with a ceramic lid using glass frit.
  - Index point is provided on cap for terminal identification only on press ceramic glass frit seal only.
  - Falls within MIL STD 1835 GDIP1-T14, GDIP1-T16, GDIP1-T18 and GDIP1-T20.

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