

October 1997 - Revised August 2003

## High-Speed CMOS Logic 8-Bit Serial-In/Parallel-Out Shift Register

### Features

- Buffered Inputs
- Asynchronous Master Reset
- Typical  $f_{MAX} = 60\text{MHz}$  at  $V_{CC} = 5\text{V}$ ,  $C_L = 15\text{pF}$ ,  $T_A = 25^\circ\text{C}$
- Fanout (Over Temperature Range)
  - Standard Outputs . . . . . 10 LSTTL Loads
  - Bus Driver Outputs . . . . . 15 LSTTL Loads
- Wide Operating Temperature Range . . .  $-55^\circ\text{C}$  to  $125^\circ\text{C}$
- 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  $V_{CC} = 5\text{V}$
- HCT Types
  - 4.5V to 5.5V Operation
  - Direct LSTTL Input Logic Compatibility,  $V_{IL} = 0.8\text{V}$  (Max),  $V_{IH} = 2\text{V}$  (Min)
  - CMOS Input Compatibility,  $I_I \leq 1\mu\text{A}$  at  $V_{OL}$ ,  $V_{OH}$

### Description

The 'HC164 and 'HCT164 are 8-bit serial-in parallel-out shift registers with asynchronous reset. Data is shifted on the positive edge of Clock (CP). A LOW on the Master Reset (MR) pin resets the shift register and all outputs go to the LOW state regardless of the input conditions. Two Serial Data inputs (DS1 and DS2) are provided, either one can be used as a Data Enable control.

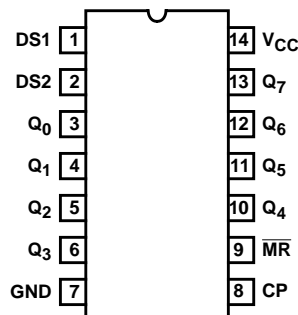
### Ordering Information

PART NUMBER	TEMP. RANGE (°C)	PACKAGE
CD54HC164F3A	-55 to 125	14 Ld CERDIP
CD54HCT164F3A	-55 to 125	14 Ld CERDIP
CD74HC164E	-55 to 125	14 Ld PDIP
CD74HC164M	-55 to 125	14 Ld SOIC
CD74HC164MT	-55 to 125	14 Ld SOIC
CD74HC164M96	-55 to 125	14 Ld SOIC
CD74HCT164E	-55 to 125	14 Ld PDIP
CD74HCT164M	-55 to 125	14 Ld SOIC
CD74HCT164MT	-55 to 125	14 Ld SOIC
CD74HCT164M96	-55 to 125	14 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.

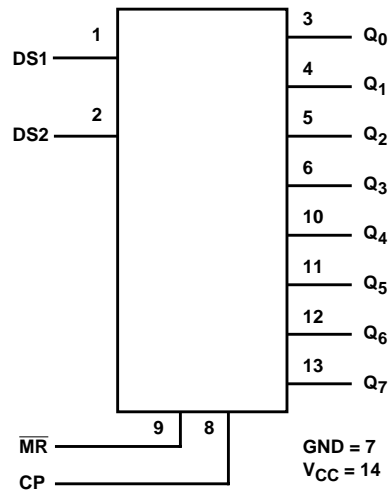
### Pinout

CD54HC164, CD54HCT164  
(CERDIP)  
CD74HC164, CD74HCT164  
(PDIP, SOIC)  
TOP VIEW



CAUTION: These devices are sensitive to electrostatic discharge. Users should follow proper IC Handling Procedures.

**Functional Diagram**



**TRUTH TABLE**

OPERATING MODE	INPUTS				OUTPUTS	
	$\overline{\text{MR}}$	CP	DS1	DS2	Q <sub>0</sub>	Q <sub>1</sub> - Q <sub>7</sub>
<b>RESET (CLEAR)</b>	L	X	X	X	L	L - L
Shift	H	↑	l	l	L	q <sub>0</sub> - q <sub>6</sub>
	H	↑	l	h	L	q <sub>0</sub> - q <sub>6</sub>
	H	↑	h	l	L	q <sub>0</sub> - q <sub>6</sub>
	H	↑	h	h	H	q <sub>0</sub> - q <sub>6</sub>

H= High Voltage Level.

h= High Voltage Level One Set-up Time Prior To The Low-to-high Clock Transition.

l= Low Voltage Level One Set-up Time Prior To The Low-to-high Clock Transition.

L= Low Voltage Level.

X= Don't Care.

↑= Transition from Low to High Level.

q<sub>n</sub>= Lower Case Letters Indicate The State Of the Reference Input Clock Transition.

# CD54HC164, CD74HC164, CD54HCT164, CD74HCT164

## 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)	$\theta_{JA}$ ( $^{\circ}C/W$ )
E (PDIP) Package .....	80
M (SOIC) Package .....	86
Maximum Junction Temperature .....	150 $^{\circ}C$
Maximum Storage Temperature Range .....	-65 $^{\circ}C$ to 150 $^{\circ}C$
Maximum Lead Temperature (Soldering 10s) .....	300 $^{\circ}C$ (SOIC - Lead Tips Only)

## Operating Conditions

Temperature Range ( $T_A$ ) .....	-55 $^{\circ}C$ to 125 $^{\circ}C$
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 $^{\circ}C$			-40 $^{\circ}C$ TO 85 $^{\circ}C$		-55 $^{\circ}C$ TO 125 $^{\circ}C$		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 $V_{IL}$	-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 $V_{IL}$	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	$\mu A$

**CD54HC164, CD74HC164, CD54HCT164, CD74HCT164**

**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> to 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
Date Shift-In (1, 2)	0.3
MR	0.9
Clock	0.7

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

**Prerequisite For Switching Function**

PARAMETER	SYMBOL	V <sub>CC</sub> (V)	25°C		-40°C TO 85°C		-55°C TO 125°C		UNITS
			MIN	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
MR Pulse Width	t <sub>w</sub>	2	60	-	75	-	90	-	ns
		4.5	12	-	15	-	18	-	ns
		6	10	-	13	-	15	-	ns

**CD54HC164, CD74HC164, CD54HCT164, CD74HCT164**

**Prerequisite For Switching Function (Continued)**

PARAMETER	SYMBOL	V <sub>CC</sub> (V)	25°C		-40°C TO 85°C		-55°C TO 125°C		UNITS
			MIN	MAX	MIN	MAX	MIN	MAX	
CP Pulse Width	t <sub>w</sub>	2	80	-	100	-	120	-	ns
		4.5	16	-	20	-	24	-	ns
		6	14	-	17	-	20	-	ns
Set-up Time	t <sub>SU</sub>	2	60	-	75	-	90	-	ns
		4.5	12	-	15	-	18	-	ns
		6	10	-	13	-	15	-	ns
Hold Time	t <sub>H</sub>	2	4	-	4	-	4	-	ns
		4.5	4	-	4	-	4	-	ns
		6	4	-	4	-	4	-	ns
MR to Clock, Removal Time	t <sub>REM</sub>	2	80	-	100	-	120	-	ns
		4.5	16	-	20	-	24	-	ns
		6	14	-	17	-	20	-	ns
<b>HCT TYPES</b>									
Maximum Clock Frequency	f <sub>MAX</sub>	4.5	27	-	22	-	18	-	MHz
MR Pulse Width	t <sub>w</sub>	6	18	-	23	-	27	-	ns
CP Pulse Width	t <sub>w</sub>	4.5	18	-	23	-	27	-	ns
Set-up Time	t <sub>SU</sub>	6	12	-	15	-	18	-	ns
Hold Time	t <sub>H</sub>	4.5	4	-	4	-	4	-	ns
MR to Clock, Removal Time	t <sub>REM</sub>	6	16	-	20	-	24	-	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
				TYP	MAX	MAX	MAX	
<b>HC TYPES</b>								
Propagation Delay, CP to Q <sub>n</sub>	t <sub>PLH</sub> , t <sub>PHL</sub>	C <sub>L</sub> = 50pF	2	-	170	212	255	ns
			4.5	-	34	43	51	ns
		C <sub>L</sub> = 15pF	5	14	-	-	-	ns
		C <sub>L</sub> = 50pF	6	-	29	36	43	ns
MR to Q <sub>n</sub>	t <sub>PLH</sub> , t <sub>PHL</sub>	C <sub>L</sub> = 50pF	2	-	140	175	210	ns
			4.5	-	28	35	42	ns
		C <sub>L</sub> = 15pF	5	11	-	-	-	ns
		C <sub>L</sub> = 50pF	6	-	24	30	36	ns
Output Transition Times	t <sub>TLH</sub> , t <sub>THL</sub>	C <sub>L</sub> = 50pF	2	-	75	-	110	ns
			4.5	-	15	-	22	ns
			6	-	13	-	19	ns
Maximum Clock Frequency	f <sub>MAX</sub>	C <sub>L</sub> = 15pF	5	60	-	-	-	MHz
Input Capacitance	C <sub>IN</sub>	-	-	-	10	10	10	pF

## CD54HC164, CD74HC164, CD54HCT164, CD74HCT164

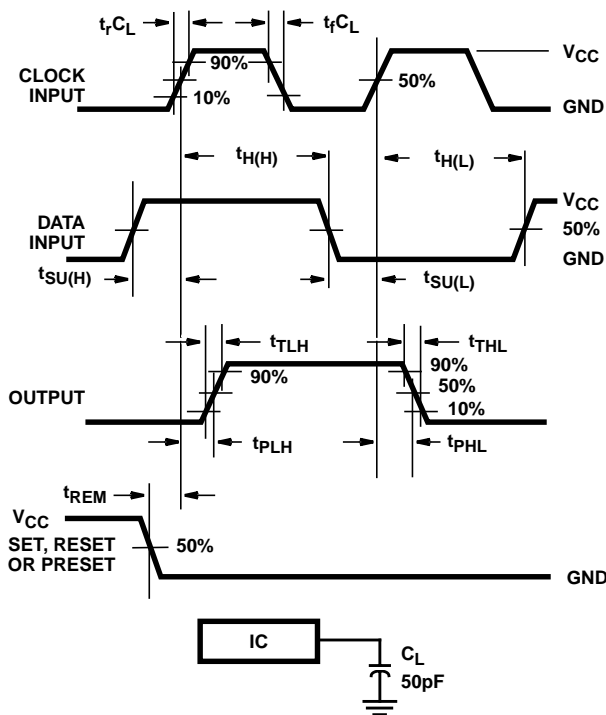
### Switching Specifications Input $t_r, t_f = 6\text{ns}$ (Continued)

PARAMETER	SYMBOL	TEST CONDITIONS	$V_{CC}$ (V)	25°C		-40°C TO 85°C	-55°C TO 125°C	UNITS
				TYP	MAX	MAX	MAX	
Power Dissipation Capacitance (Notes 3, 4)	$C_{PD}$	-	5	47	-	-	-	pF
<b>HCT TYPES</b>								
Propagation Delay, CP to $Q_n$	$t_{PLH}, t_{PHL}$	$C_L = 50\text{pF}$	4.5	-	36	45	54	ns
		$C_L = 15\text{pF}$	5	15	-	-	-	ns
MR to $Q_n$	$t_{PLH}, t_{PHL}$	$C_L = 50\text{pF}$	4.5	-	38	46	57	ns
		$C_L = 15\text{pF}$	5	16	-	-	-	ns
Output Transition Times	$t_{TLH}, t_{THL}$	$C_L = 50\text{pF}$	4.5	-	15	19	22	ns
Input Capacitance	$C_{IN}$	-	-	-	-	-	-	pF
Maximum Clock Frequency	$f_{MAX}$	$C_L = 15\text{pF}$	-	54	-	-	-	MHz
Power Dissipation Capacitance (Notes 3, 4)	$C_{PD}$	-	5	49	10	10	10	pF

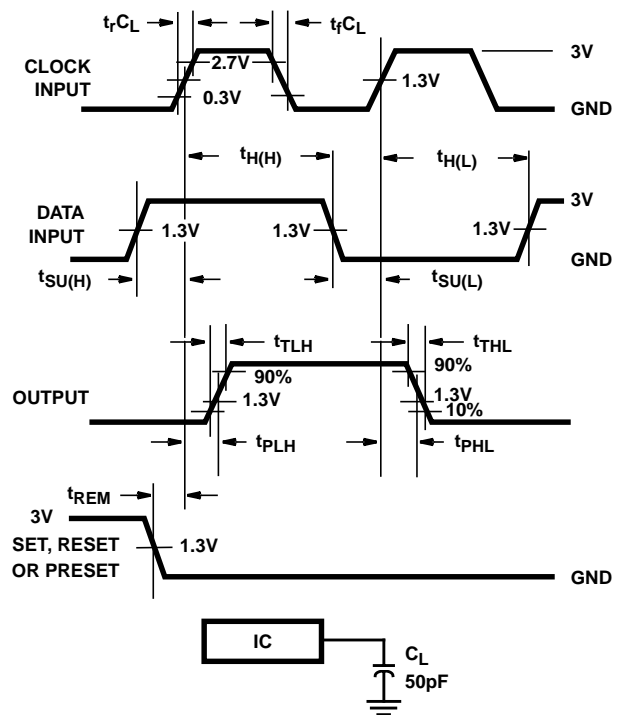
**NOTES:**

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

### Test Circuits and Waveforms



**FIGURE 1. HC SETUP TIMES, HOLD TIMES, REMOVAL TIME, AND PROPAGATION DELAY TIMES FOR EDGE TRIGGERED SEQUENTIAL LOGIC CIRCUITS**



**FIGURE 2. HCT SETUP TIMES, HOLD TIMES, REMOVAL TIME, AND PROPAGATION DELAY TIMES FOR EDGE TRIGGERED SEQUENTIAL LOGIC CIRCUITS**

**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
5962-8970401CA	ACTIVE	CDIP	J	14	1	TBD	A42	N / A for Pkg Type	-55 to 125	5962-8970401CA CD54HCT164F3A	<a href="#">Samples</a>
CD54HC164F	ACTIVE	CDIP	J	14	1	TBD	A42	N / A for Pkg Type	-55 to 125	CD54HC164F	<a href="#">Samples</a>
CD54HC164F3A	ACTIVE	CDIP	J	14	1	TBD	A42	N / A for Pkg Type	-55 to 125	8416201CA CD54HC164F3A	<a href="#">Samples</a>
CD54HCT164F3A	ACTIVE	CDIP	J	14	1	TBD	A42	N / A for Pkg Type	-55 to 125	5962-8970401CA CD54HCT164F3A	<a href="#">Samples</a>
CD74HC164E	ACTIVE	PDIP	N	14	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	-55 to 125	CD74HC164E	<a href="#">Samples</a>
CD74HC164EE4	ACTIVE	PDIP	N	14	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	-55 to 125	CD74HC164E	<a href="#">Samples</a>
CD74HC164M	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-55 to 125	HC164M	<a href="#">Samples</a>
CD74HC164M96	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-55 to 125	HC164M	<a href="#">Samples</a>
CD74HC164M96G4	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-55 to 125	HC164M	<a href="#">Samples</a>
CD74HC164ME4	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-55 to 125	HC164M	<a href="#">Samples</a>
CD74HC164MG4	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-55 to 125	HC164M	<a href="#">Samples</a>
CD74HC164MT	ACTIVE	SOIC	D	14	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-55 to 125	HC164M	<a href="#">Samples</a>
CD74HCT164E	ACTIVE	PDIP	N	14	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	-55 to 125	CD74HCT164E	<a href="#">Samples</a>
CD74HCT164EE4	ACTIVE	PDIP	N	14	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	-55 to 125	CD74HCT164E	<a href="#">Samples</a>
CD74HCT164M	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-55 to 125	HCT164M	<a href="#">Samples</a>
CD74HCT164M96	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-55 to 125	HCT164M	<a href="#">Samples</a>
CD74HCT164M96E4	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-55 to 125	HCT164M	<a href="#">Samples</a>

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
CD74HCT164M96G4	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-55 to 125	HCT164M	<a href="#">Samples</a>
CD74HCT164MG4	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-55 to 125	HCT164M	<a href="#">Samples</a>
CD74HCT164MT	ACTIVE	SOIC	D	14	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-55 to 125	HCT164M	<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.

**OBSOLETE:** TI has discontinued the production of the device.

(2) Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

**TBD:** The Pb-Free/Green conversion plan has not been defined.

**Pb-Free (RoHS):** TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

**Pb-Free (RoHS Exempt):** This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

**Green (RoHS & no Sb/Br):** TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

(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 CD54HC164, CD54HCT164, CD74HC164, CD74HCT164 :**

- Catalog: [CD74HC164](#), [CD74HCT164](#)
- Military: [CD54HC164](#), [CD54HCT164](#)

NOTE: Qualified Version Definitions:

- Catalog - TI's standard catalog product
- Military - QML certified for Military and Defense Applications

**TAPE AND REEL INFORMATION**
**REEL DIMENSIONS**

**TAPE DIMENSIONS**


A0	Dimension designed to accommodate the component width
B0	Dimension designed to accommodate the component length
K0	Dimension designed to accommodate the component thickness
W	Overall width of the carrier tape
P1	Pitch between successive cavity centers

**TAPE AND REEL INFORMATION**

\*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
CD74HC164M96	SOIC	D	14	2500	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1
CD74HC164MT	SOIC	D	14	250	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1
CD74HCT164M96	SOIC	D	14	2500	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1
CD74HCT164MT	SOIC	D	14	250	330.0	16.4	6.5	9.0	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)
CD74HC164M96	SOIC	D	14	2500	367.0	367.0	38.0
CD74HC164MT	SOIC	D	14	250	367.0	367.0	38.0
CD74HCT164M96	SOIC	D	14	2500	367.0	367.0	38.0
CD74HCT164MT	SOIC	D	14	250	367.0	367.0	38.0

# 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.
  - 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-G14)

PLASTIC SMALL OUTLINE



- 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 AB.

D (R-PDSO-G14)

PLASTIC SMALL OUTLINE



4211283-3/E 08/12

- NOTES:
- A. All linear dimensions are in millimeters.
  - B. This drawing is subject to change without notice.
  - C. Publication IPC-7351 is recommended for alternate designs.
  - D. 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.
  - E. Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.

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