

Data sheet acquired from Harris Semiconductor SCHS273E

August 1997 - Revised September 2003

Features

- Buffered Inputs
- Typical Propagation Delay: 8ns at V_{CC} = 5V, C_L = 15pF, T_A = 25°C
- 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, II \leq 1µA at VOL, VOH

CD54HC11, CD74HC11, CD54HCT11, CD74HCT11

High-Speed CMOS Logic Triple 3-Input AND Gate

Description

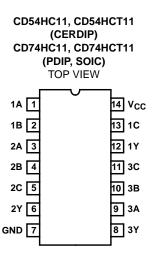
The 'HC11 and 'HCT11 logic gates utilize silicon gate CMOS technology to achieve operating speeds similar to LSTTL gates with the low power consumption of standard CMOS integrated circuits. All devices have the ability to drive 10 LSTTL loads. The HCT logic family is functionally pin compatible with the standard LS logic family.

Ordering Information

PART NUMBER	TEMP. RANGE (^o C)	PACKAGE
CD54HC11F3A	-55 to 125	14 Ld CERDIP
CD54HCT11F3A	-55 to 125	14 Ld CERDIP
CD74HC11E	-55 to 125	14 Ld PDIP
CD74HC11M	-55 to 125	14 Ld SOIC
CD74HC11MT	-55 to 125	14 Ld SOIC
CD74HC11M96	-55 to 125	14 Ld SOIC
CD74HCT11E	-55 to 125	14 Ld PDIP
CD74HCT11M	-55 to 125	14 Ld SOIC
CD74HCT11MT	-55 to 125	14 Ld SOIC
CD74HCT11M96	-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.

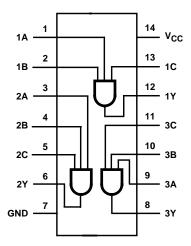
Pinout



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

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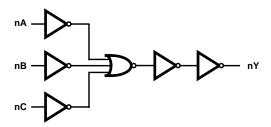
Functional Diagram



TRUTH TABLE

INP	UTS		OUTPUT
nA	nB	nC	nY
L	L	L	L
L	L	Н	L
L	Н	L	L
L	Н	н	L
н	L	L	L
Н	L	Н	L
Н	Н	L	L
Н	Н	Н	Н

Logic Symbol



Absolute Maximum Ratings

DC Supply Voltage, V _{CC} 0.5V to 7V DC Input Diode Current, I _{IK}
For $V_{l} < -0.5V$ or $V_{l} > V_{CC} + 0.5V$ ±20mA
DC Output Diode Current, I _{OK}
For $V_O < -0.5V$ or $V_O > V_{CC} + 0.5V$ ±20mA
DC Output Source or Sink Current per Output Pin, IO
For $V_{O} > -0.5V$ or $V_{O} < V_{CC} + 0.5V$
DC V _{CC} or Ground Current, I _{CC or} I _{GND} ±50mA
Operating Conditions

Operating Conditions

Temperature Range (T _A)55°C to 125°C
Supply Voltage Range, V _{CC}
HC Types
HCT Types4.5V to 5.5V
DC Input or Output Voltage, V _I , V _O 0V to V _{CC}
Input Rise and Fall Time
2V
4.5V 500ns (Max)
6V

Thermal Information

Thermal Resistance (Typical, Note 1)	θ _{JA} (^o C/W)
E (PDIP) Package	80
M (SOIC) Package	86
Maximum Junction Temperature (Hermetic Package or Die	
Maximum Junction Temperature (Plastic Package)	150 ⁰ C
Maximum Storage Temperature Range65	^o C to 150 ^o C
Maximum Lead Temperature (Soldering 10s)	300 ⁰ C
(SOIC - Lead Tips Only)	

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

		TE COND	ST ITIONS		25°C		-40 ⁰ C 1	O 85 ⁰ C	-55°С Т	O 125 ⁰ C								
PARAMETER	SYMBOL	V _I (V)	I _O (mA)	V _{CC} (V)	MIN	TYP	MAX	MIN	MAX	MIN	MAX							
HC TYPES									-	-	-	-						
High Level Input	V _{IH}	-	-	2	1.5	-	-	1.5	-	1.5	-	V						
Voltage				4.5	3.15	-	-	3.15	-	3.15	-	V						
				6	4.2	-	-	4.2	-	4.2	-	V						
Low Level Input	V _{IL}	-	-	2	-	-	0.5	-	0.5	-	0.5	V						
Voltage				4.5	-	-	1.35	-	1.35	-	1.35	V						
				6	-	-	1.8	-	1.8	-	1.8	V						
High Level Output	V _{OH}	V _{IH} or	-0.02	2	1.9	-	-	1.9	-	1.9	-	V						
Voltage CMOS Loads		VIL	-0.02	4.5	4.4	-	-	4.4	-	4.4	-	V						
			-0.02	6	5.9	-	-	5.9	-	5.9	-	V						
High Level Output									-	-	-	-	-	-	-	-	-	V
Voltage TTL Loads										-4	4.5	3.98	-	-	3.84	-	3.7	-
			-5.2	6	5.48	-	-	5.34	-	5.2	-	V						
Low Level Output	V _{OL}	V _{IH} or	0.02	2	-	-	0.1	-	0.1	-	0.1	V						
Voltage		VIL	0.02	4.5	-	-	0.1	-	0.1	-	0.1	V						
			0.02	6	-	-	0.1	-	0.1	-	0.1	V						
Low Level Output	7		-	-	-	-	-	-	-	-	-	V						
Voltage TTL Loads			4	4.5	-	-	0.26	-	0.33	-	0.4	V						
			5.2	6	-	-	0.26	-	0.33	-	0.4	V						
Input Leakage Current	lı	V _{CC} or GND	-	6	-	-	±0.1	-	±1	-	±1	μA						

CD54HC11, CD74HC11, CD54HCT11, CD74HCT11

TEST CONDITIONS 25°C -40°C TO 85°C -55°C TO 125°C PARAMETER SYMBOL MIN TYP MAX MIN MAX MIN MAX UNITS V₁ (V) I_O (mA) V_{CC} (V) **Quiescent Device** 40 0 6 2 20 μΑ Icc V_{CC} or Current GND HCT TYPES VIH V High Level Input 4.5 to 2 2 2 --_ -Voltage 5.5 Low Level Input V VIL -4.5 to -0.8 -0.8 0.8 ---Voltage 5.5 High Level Output V_{ОН} V_{IH} or -0.02 4.5 4.4 -4.4 4.4 V -_ -Voltage CMOS Loads V_{IL} High Level Output -4 4.5 3.98 3.84 3.7 V ----Voltage TTL Loads Low Level Output 0.02 4.5 0.1 0.1 0.1 V VOL V_{IH} or ----Voltage V_{IL} CMOS Loads Low Level Output V 4 4.5 0.26 -0.33 0.4 ---Voltage TTL Loads Input Leakage Ч V_{CC} -5.5 -±0.1 -±1 -±1 μA Current and GND 20 Quiescent Device 5.5 40 V_{CC} or -_ -2 -μΑ Icc GND Current Additional Quiescent V_{CC} 4.5 to 100 490 360 450 μΑ ΔI_{CC} ----**Device Current Per** (Note 2) - 2.1 5.5 Input Pin: 1 Unit Load

DC Electrical Specifications (Continued)

NOTE:

2. For dual-supply systems theoretical worst case (V_I = 2.4V, V_{CC} = 5.5V) specification is 1.8mA.

HCT Input Loading Table

INPUT	UNIT LOADS
All	0.5

NOTE: Unit Load is ΔI_{CC} limit specified in DC Electrical Specifications table, e.g. 360µA max at 25°C.

Switching Specifications Input tr, tf = 6ns

		TEST	v _{cc}		25 ⁰ C		-40 ⁰ C T	O 85 ⁰ C	-55 ⁰ C T	O 125 ⁰ C	
PARAMETER	SYMBOL	CONDITIONS	(V)	MIN	ТҮР	MAX	MIN	MAX	MIN	MAX	UNITS
HC TYPES											
Propagation Delay,	t _{PLH} , t _{PHL}	$C_L = 50 pF$	2	-	-	100	-	125	-	150	ns
Input to Output (Figure 1)			4.5	-	-	20	-	25	-	30	ns
			6	-	-	17	-	21	-	26	ns
Propagation Delay, Data Input to Output Y	t _{PLH} , t _{PHL}	C _L = 15pF	5	-	8	-	-	-	-	-	ns

CD54HC11, CD74HC11, CD54HCT11, CD74HCT11

		TEST	v _{cc}		25 ⁰ C		-40°C TO 85°C		-55°C TO 125°C		
PARAMETER	SYMBOL	CONDITIONS	(V)	MIN	ТҮР	MAX	MIN	MAX	MIN	MAX	UNITS
Transition Times (Figure 1)	t _{TLH} , t _{THL}	C _L = 50pF	2	-	-	75	-	95	-	110	ns
			4.5	-	-	15	-	19	-	22	ns
			6	-	-	13	-	16	-	19	ns
Input Capacitance	Cl	C _L = 50pF	-	-	-	10	-	10	-	10	pF
Power Dissipation Capacitance (Notes 3, 4)	C _{PD}	C _L = 15pF	5	-	26	-	-	-	-	-	pF
HCT TYPES											
Propagation Delay, Input to Output (Figure 2)	t _{PLH} , t _{PHL}	C _L = 50pF	4.5	-	-	28	-	35	-	42	ns
Propagation Delay, Data Input to Output Y	t _{PLH} , t _{PHL}	C _L = 15pF	5	-	11	-	-	-	-	-	ns
Transition Times (Figure 2)	t _{TLH} , t _{THL}	C _L = 50pF	4.5	-	-	15	-	19	-	22	ns
Input Capacitance	Cl	C _L = 50pF	-	-	-	10	-	10	-	10	pF
Power Dissipation Capacitance (Notes 3, 4)	C _{PD}	-	5	-	28	-	-	-	-	-	pF

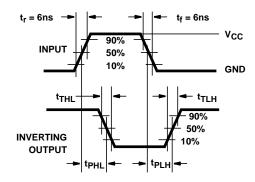
Switching Specifications Input tr, tf = 6ns (Continued)

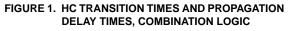
NOTES:

3. $C_{\mbox{PD}}$ is used to determine the dynamic power consumption, per gate.

4. $P_D = V_{CC}^2 f_i (C_{PD} + C_L)$ where f_i = input frequency, C_L = output load capacitance, V_{CC} = supply voltage.

Test Circuits and Waveforms





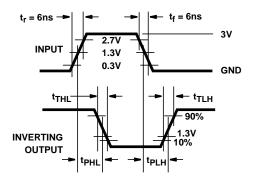


FIGURE 2. HCT TRANSITION TIMES AND PROPAGATION DELAY TIMES, COMBINATION LOGIC

9-Oct-2007

PACKAGING INFORMATION

Orderable Device	Status ⁽¹⁾	Package Type	Package Drawing	Pins	Package Qty	e Eco Plan ⁽²⁾	Lead/Ball Finish	MSL Peak Temp ⁽³⁾
5962-8970901CA	ACTIVE	CDIP	J	14	1	TBD	A42 SNPB	N / A for Pkg Type
CD54HC11F	ACTIVE	CDIP	J	14	1	TBD	A42 SNPB	N / A for Pkg Type
CD54HC11F3A	ACTIVE	CDIP	J	14	1	TBD	A42 SNPB	N / A for Pkg Type
CD54HCT11F	ACTIVE	CDIP	J	14	1	TBD	A42 SNPB	N / A for Pkg Type
CD54HCT11F3A	ACTIVE	CDIP	J	14	1	TBD	A42 SNPB	N / A for Pkg Type
CD74HC11E	ACTIVE	PDIP	Ν	14	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type
CD74HC11EE4	ACTIVE	PDIP	Ν	14	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type
CD74HC11M	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
CD74HC11M96	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
CD74HC11M96E4	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
CD74HC11M96G4	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
CD74HC11ME4	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
CD74HC11MG4	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
CD74HC11MT	ACTIVE	SOIC	D	14	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
CD74HC11MTE4	ACTIVE	SOIC	D	14	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
CD74HC11MTG4	ACTIVE	SOIC	D	14	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
CD74HCT11E	ACTIVE	PDIP	Ν	14	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type
CD74HCT11EE4	ACTIVE	PDIP	Ν	14	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type
CD74HCT11M	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
CD74HCT11M96	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
CD74HCT11M96E4	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
CD74HCT11M96G4	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
CD74HCT11ME4	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
CD74HCT11MG4	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
CD74HCT11MT	ACTIVE	SOIC	D	14	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
CD74HCT11MTE4	ACTIVE	SOIC	D	14	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
CD74HCT11MTG4	ACTIVE	SOIC	D	14	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM



⁽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)

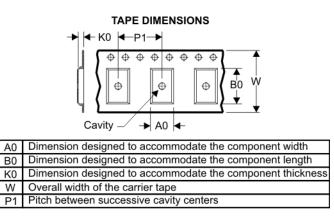
⁽³⁾ MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

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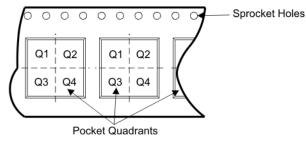
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TAPE AND REEL BOX INFORMATION





QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE

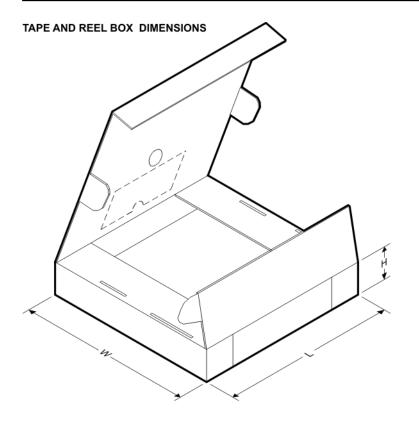


Device	Package	Pins	Site	Reel Diameter (mm)	Reel Width (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
CD74HC11M96	D	14	SITE 41	330	16	6.5	9.0	2.1	8	16	Q1
CD74HCT11M96	D	14	SITE 41	330	16	6.5	9.0	2.1	8	16	Q1



PACKAGE MATERIALS INFORMATION

4-Oct-2007



Device	Package	Pins	Site	Length (mm)	Width (mm)	Height (mm)
CD74HC11M96	D	14	SITE 41	346.0	346.0	33.0
CD74HCT11M96	D	14	SITE 41	346.0	346.0	33.0

J (R-GDIP-T**) 14 LEADS SHOWN

CERAMIC DUAL IN-LINE PACKAGE



NOTES: A. All linear dimensions are in inches (millimeters).

- B. This drawing is subject to change without notice.
- C. This package is hermetically sealed with a ceramic lid using glass frit.
- D. Index point is provided on cap for terminal identification only on press ceramic glass frit seal only.
- E. 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).
- \triangle The 20 pin end lead shoulder width is a vendor option, either half or full width.



D (R-PDSO-G14)

PLASTIC SMALL-OUTLINE PACKAGE



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 .006 (0,15) per end.

Body width does not include interlead flash. Interlead flash shall not exceed .017 (0,43) per side.

E. Reference JEDEC MS-012 variation AB.



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