

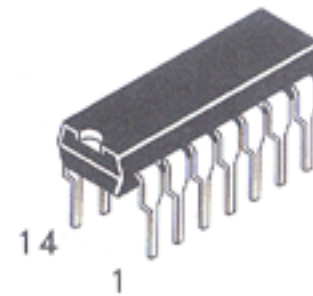
DV74HCT11 Available Q2, 1995

### Triple 3-Input AND Gate

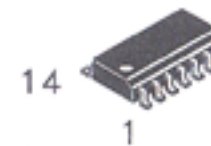
**DV74HC11**  
**DV74HCT11**

This device contains three independent gates, each of which performs the logic AND function.

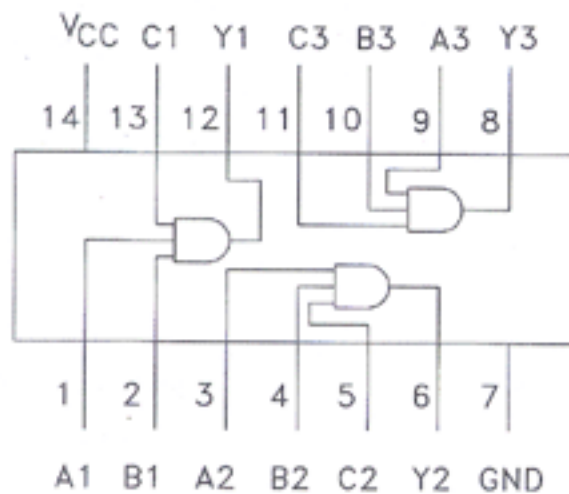
- Output Drive Capability: 10 LSTTL Loads
- Outputs Directly Interface to CMOS, NMOS, and TTL
- Operating Voltage Range: 2 to 6 V for HC devices
- Low Input Current: 1  $\mu$ A
- DC, AC parameters guaranteed from -55°C to 125°C



N Suffix  
Plastic DIP  
AVG-001 Case



D Suffix  
Plastic SOP  
AVG-002 Case



TRUTH TABLE  
Y = ABC

Inputs			Outputs
A	B	C	Y
L	X	X	L
X	L	X	L
X	X	L	L
H	H	H	H

H = High Logic Level  
L = Low Logic Level  
X = Don't Care

#### ABSOLUTE MAXIMUM RATINGS

Maximum ratings are those values beyond which damage to the device may occur.

Symbol	Parameter	Value	Unit
V <sub>CC</sub>	DC Supply Voltage (Referenced to GND)	-0.5 to +7.0	V
V <sub>IN</sub>	DC Input Voltage (Referenced to GND)	-1.5 to V <sub>CC</sub> + 1.5	V
V <sub>OUT</sub>	DC Output Voltage (Referenced to GND)	-0.5 to V <sub>CC</sub> + 0.5	V
I <sub>IN</sub>	DC Input Current, per Pin	± 20	mA
I <sub>OUT</sub>	DC Output Current, per Pin	± 25	mA
I <sub>CC</sub>	DC Supply Current, V <sub>CC</sub> and GND Pins	± 50	mA
P <sub>D</sub>	Power Dissipation in Still Air, Plastic DIP SOP Package	750 500	mW
T <sub>STG</sub>	Storage Temperature Range	-65 to +150	°C
TL	Lead Temperature, 1mm from Case for 10 Seconds (Plastic DIP or Sop Package)	260	°C

#### GUARANTEED OPERATING CONDITIONS

Symbol	Parameter	Min	Max	Unit
V <sub>CC</sub>	DC Supply Voltage, HC (HCT), Referenced to GND	2.0 (4.5)	6.0 (5.5)	V
V <sub>IN</sub> , V <sub>OUT</sub>	DC Input Voltage, Output Voltage, Referenced to GND	0	V <sub>CC</sub>	V
T <sub>A</sub>	Ambient Temperature	-55	+125	°C
t <sub>r</sub> , t <sub>f</sub>	Input Rise and Fall Time: HC: V <sub>CC</sub> =2.0V HCT: V <sub>CC</sub> =5.5V / HC: V <sub>CC</sub> =4.5V HC: V <sub>CC</sub> =6.0V	0	1000 500 400	ns

# HC-11

## DC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Conditions	V <sub>CC</sub> V	Guaranteed Limits			Unit
				25°C to -55°C	≤85°C	≤125°C	
V <sub>IH</sub>	Minimum High-Level Input Voltage	V <sub>OUT</sub> =0.1V, or V <sub>OUT</sub> =V <sub>CC</sub> -0.1V I <sub>OUT</sub> ≤ 20 μA	2.0	1.5	1.5	1.5	V
			4.5	3.15	3.15	3.15	
			6.0	4.2	4.2	4.2	
V <sub>IL</sub>	Maximum Low-Level Input Voltage	V <sub>OUT</sub> =0.1V, or V <sub>OUT</sub> =V <sub>CC</sub> -0.1V I <sub>OUT</sub> ≤ 20 μA	2.0	0.3	0.3	0.3	V
			4.5	0.9	0.9	0.9	
			6.0	1.2	1.2	1.2	
V <sub>OH</sub>	Minimum High-Level Output Voltage	V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub> I <sub>OUT</sub> ≤ 20 μA	2.0	1.9	1.9	1.9	V
			4.5	4.4	4.4	4.4	
		V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub> , I <sub>OUT</sub> ≤ 4.0mA I <sub>OUT</sub> ≤ 5.2 mA	4.5	3.98	3.84	3.7	
			6.0	5.48	5.34	5.2	
V <sub>OL</sub>	Maximum Low Level Output Voltage	V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub> I <sub>OUT</sub> ≤ 20 μA	2.0	0.1	0.1	0.1	V
			4.5	0.1	0.1	0.1	
		V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub> , I <sub>OUT</sub> ≤ 4.0mA I <sub>OUT</sub> ≤ 5.2 mA	4.5	0.26	0.33	0.40	V
			6.0	0.26	0.33	0.40	
I <sub>IN</sub>	Maximum Input Leakage Current	V <sub>IN</sub> = V <sub>CC</sub> or GND	6.0	± 0.1	± 1.0	± 1.0	μA
I <sub>CC</sub>	Maximum Quiescent Supply Current (Per Package)	V <sub>IN</sub> = V <sub>CC</sub> or GND I <sub>OUT</sub> ≤ 0 μA	6.0	2.0	20	40	μA

## AC ELECTRICAL CHARACTERISTICS over full operating conditions (C<sub>L</sub>=50 pF, Input t<sub>r</sub>=t<sub>f</sub>=6ns)

Symbol	Parameter	V <sub>CC</sub> V	Guaranteed Limit			Unit
			25°C to -55°C	≤85°C	≤125°C	
t <sub>PLH</sub> , t <sub>PHL</sub>	Maximum Propagation Delay Time, Input A, B or C To Output Y	2.0	125	155	190	ns
		4.5	25	31	38	
		6.0	21	26	32	
t <sub>TLH</sub> , t <sub>THL</sub>	Maximum Output Transition Time Any Output	2.0	75	95	110	ns
		4.5	15	19	22	
		6.0	13	16	19	
C <sub>IN</sub>	Maximum Input Capacitance	—	10	10	10	pF

C <sub>PD</sub>	Power Dissipation Capacitance (Per Gate) Used to determine the no-load dynamic power consumption, P <sub>D</sub> = C <sub>PD</sub> V <sub>CC</sub> <sup>2</sup> f + I <sub>CC</sub> V <sub>CC</sub>	Typical @ 25°C, V <sub>CC</sub> = 5 V			pF
		27			

# HCT-11

## DC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Conditions	V <sub>CC</sub> V	Guaranteed Limits						Unit
				25°C to -55°C		≤85°C		≤125°C		
				Min	Max	Min	Max	Min	Max	
V <sub>IH</sub>	Minimum High-Level Input Voltage	V <sub>OUT</sub> = 0.1 V or V <sub>CC</sub> -0.1 V I <sub>OUT</sub> ≤ 20 μA	4.5	2.00		2.00		2.00		V
			5.5	2.00		2.00		2.00		
V <sub>IL</sub>	Maximum Low-Level Input Voltage	V <sub>OUT</sub> = 0.1 V or V <sub>CC</sub> -0.1 V I <sub>OUT</sub> ≤ 20 μA	4.5		0.80		0.80		0.80	V
			5.5		0.80		0.80		0.80	

Symbol	Parameter	Conditions	V <sub>CC</sub> V	Guaranteed Limits						Unit
				25°C to -55°C		≤85°C		≤125°C		
				Min	Max	Min	Max	Min	Max	
V <sub>OH</sub>	Minimum High-Level Output Voltage	V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub>  I <sub>OUT</sub>   ≤ 20 μA	4.5	4.40		4.40		4.40		V
		V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub>  I <sub>OUT</sub>   ≤ 4.0 mA	4.5	3.98		3.84		3.70		V
V <sub>OL</sub>	Maximum Low Level Output Voltage	V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub>  I <sub>OUT</sub>   ≤ 20 μA	4.5		0.1		0.1		0.1	V
		V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub>  I <sub>OUT</sub>   ≤ 4.0mA	4.5		0.26		0.33		0.40	V
I <sub>IN</sub>	Maximum Input Leakage Current	V <sub>IN</sub> = V <sub>CC</sub> or GND	5.5		± 0.1		± 0.1		± 1.0	μA
I <sub>CC</sub>	Maximum Quiescent Supply Current	V <sub>IN</sub> = V <sub>CC</sub> or GND  I <sub>OUT</sub>   = 0 μA	5.5		2.0		20		40	μA

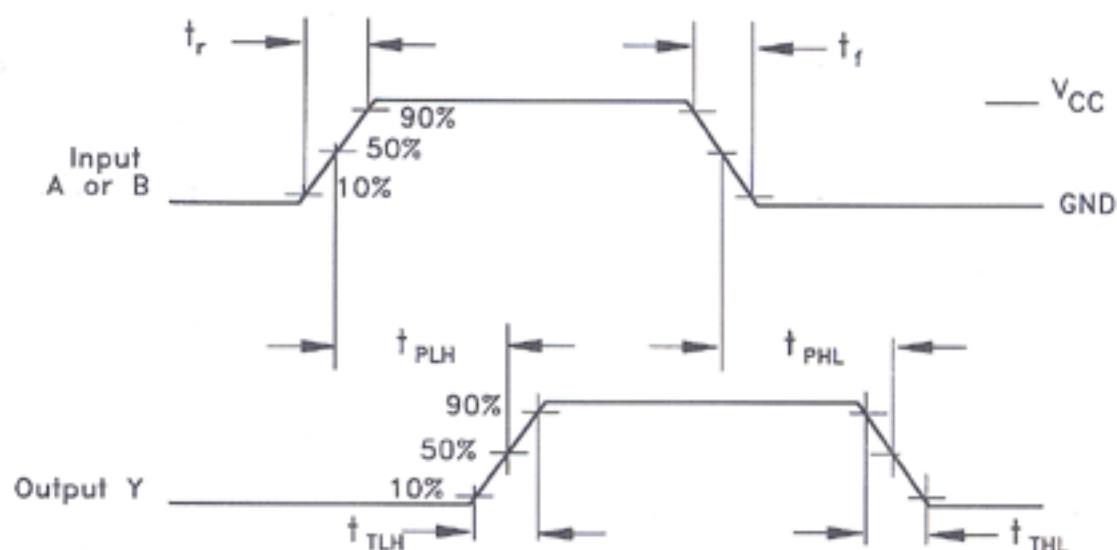
Δ I <sub>CC</sub>	Additional Quiescent Supply Current	V <sub>IN</sub> =2.4V, Any One Input V <sub>IN</sub> =V <sub>CC</sub> or GND, Other Inputs I <sub>OUT</sub> =0 μA	5.5	≥ -55°C	25°C to 125°C	mA
				2.9	2.4	

### AC ELECTRICAL CHARACTERISTICS over full operating conditions (CL=50pF, Input t<sub>f</sub>=t<sub>r</sub>=6ns)

Symbol	Parameter	V <sub>CC</sub> V	Guaranteed Limit						Unit
			25°C to -55°C		≤85°C		≤125°C		
			Min	Max	Min	Max	Min	Max	
t <sub>PLH</sub> , t <sub>PHL</sub>	Propagation Delay Time, Input to Output	5.0V ± 10%		25		31		38	ns
t <sub>TLH</sub> , t <sub>THL</sub>	Output Transition Time Any Output			15		19		22	ns
C <sub>IN</sub>	Maximum Input Capacitance	—		10		10		10	pF

C <sub>PD</sub>	Power Dissipation Capacitance (Per Inverter) Used to determine the no-load dynamic power consumption, P <sub>D</sub> = C <sub>PD</sub> V <sub>CC</sub> <sup>2</sup> f + I <sub>CC</sub> V <sub>CC</sub>	Typical @ 25°C, V <sub>CC</sub> = 5 V		pF
		30		

### SWITCHING WAVEFORMS



Input and Output threshold voltage:  
 $V_T = 50\% V_{CC}$  for HC, 1.3 for HCT  
 $V_H = V_{CC}$  for HC, 3V for HCT