CD54/74HC/HCT Series

The Harris HC/HCT series of high-speed CMOS logic integrated circuits includes an extensive line of products that are pin compatible with many existing bipolar 54/74 LSTTL and CMOS 4000 series of digital logic types. The new HC/HCT series ICs provide high-speed CMOS replacements for the most popular LSTTL devices in existing designs and also offer low-power all-CMOS designs for the new digital systems. Key family features of the Harris HC/HCT types include:

- Speeds equivalent to LSTTL types with typical gate delays of 8ns.
- Fanout to 10 74LSTTL loads; 15 loads using Bus Driver 54/74 types.
- Operating frequencies equivalent to LSTTL types, typically 50MHz.
- Full Operating Temperatue Ranges:
  F Package: -55 to +125°C
  E & M Packages: -40 to +125°C
- The high voltage noise immunity characteristic of CMOS, typically 45 percent of V_{CC}, a two to three times improvement over LSTTL (HC-series types.)
- Wide range of power supply operating voltages, 2 to 6 volts.
- CMOS low static power consumption, typically less than 1 microwatt.

The product line consists of CD54/74HC-series types, which feature CMOS input voltage level compatability, and CD54/74HCT-series types, which are input voltage level compatible with LSTTL devices. The line also includes a limited number of single-stage, unbuffered inverter types (CD54/74HCU-series) for added versatility in oscillator and amplifier applications.

Standardized Maximum Ratings and Recommended Operating Conditions for CD54/74HC, CD54/74HCT, and CD54/74HCU Integrated Circuits

Maximum Ratings, Absolute-Maximum Values:

DC Supply-Voltage (V_{CC})
(Voltages referenced to ground) ..... -0.5 to +7V
DC Input Diode Current, I_{IK} (for $V_I < -0.5V$ or $V_I > V_{CC} + 0.5V$) ..... ±20mA
DC Output Diode Current, I_{OK} (for $V_O < -0.5V$ or $V_O > V_{CC} + 0.5V$) ..... ±20mA
DC Drain Current, Per Output (I_O) (for $-0.5V < V_O < V_{CC} + 0.5V$):
Standard Output ..... ±25mA
Bus Driver Output ..... ±35mA
DC V_{CC} or Ground Current (I_{CC}):
Standard Output ..... ±50mA
Bus Driver Output ..... ±70mA
* Power Dissipation Per Package (P_D):
For T_A = -40 to +100°C (Package Type E) 500mW
For T_A = +100 to +125°C (Package Type E) ..... Derate Linearly at 8m/°C to 300mW
For T_A = -55 to +100°C (Package Type F,) 500mW
For T_A = +100 to +125°C (Package Type F,) ..... Derate Lineraly at 8mW/°C to 300mW
For T_A = -40 to +70°C (Package Type M) 400mW
For T_A = +70 to +125°C (Package Type M) ..... Derate Linearly at 6mW/°C to 70mW
Operating-Temperature Range (T_A):
Package Types F, H ..... -55 to +125°C
Package Type E, M ..... -40 to +125°C
Storage Temperature (T_{STG}) ..... -65 to +150°C
Lead Temperature (During Soldering):
At distance 1/16 ± 1/32in. (1.59 ± 0.79mm) from case for 10s maximum ..... +265°C
Unit inserted into PC board min. thickness 1/16in.
(1.59mm) with solder contacting lead tips only ..... +300°C

* See interpretation guide and packaging section

Recommended Operating Conditions:

For maximum reliability, normal operating conditions should be selected so that operation is always within the following ranges:

Characteristics		Limits Min	Limits Max	Units
Supply-Voltage Range (For T_A = Full Package-Temperature Range) V_{CC}:*				
	CD54/74HC Types (and CD54/74HCU04)	2	6	V
	CD54/74HCT Types	4.5	5.5	V
DC Input or Output Voltage, V_I, V_O		0	V_{CC}	V
Operating Temperature, T_A:	CD74 Types	-40	+125	°C
	CD54 Types	-55	+125	
Input Rise and Fall Times t_r, t_f	at 2V	0	1000	ns
	at 4.5V	0	500	ns
	at 6V	0	400	ns

* Unless otherwise specified, all voltages are referenced to ground.

CD54/74HC/HCT Series (Continued)

Product Classification Chart

Gates

NOR/NAND — CD54/74HC/HCT

HC/HCT02
HC/HCT03*
HC/HCT27
HC/HCT4002

Exclusive-NOR

HC7266

OR/AND — CD54/74HC/HCT

HC/HCT00
HC/HCT10
HC/HCT20
HC/HCT30

Inverters

HC/HCT04
HCU04

Exclusive OR

HC/HCT08
HC/HCT11
HC/HCT21
HC/HCT32
HC/HCT4075

HC/HCT86

Buffers Line-Drivers

HC/HCT240 •
HC/HCT241 •
HC/HCT244 •
HC/HCT355 •
HC/HCT366 •
HC/HCT367 •
HC/HCT368 •
HC/HCT540 •
HC/HCT541 •

High-to-Low Level Shifters

HC4049
HC4050

Bus Drivers — CD54/74/HC/HCT

HC/HCT125
HC/HCT126
HC/HCT241 •
HC/HCT244 •
HC/HCT365 •
HC/HCT366 •
HC/HCT367 •
HC/HCT368 •
HC/HCT540 •
HC/HCT541 •

Multi-Function AOI

HC/HCT86
HC/HCT266

Decoders/ Encoders/

HC/HCT42
HC/HCT137
HC/HCT138
HC/HCT139
HC/HCT147
HC/HCT154
HC/HCT237
HC/HCT238
HC/HCT4511
HC/HCT4514
HC/HCT4515
HC/HCT4543

Schmitt Trigger

HC/HCT14
HC/HCT132

Multivibrators

Flip-Flops — CD54/74HC/HCT

HC/HCT73
HC/HCT74
HC/HCT107
HC/HCT109
HC/HCT122
HC/HCT173 •
HC/HCT174
HC/HCT175
HC/HCT273
HC/HCT374 •
HC/HCT377
HC/HCT534 •
HC/HCT564 •
HC/HCT574 •

Latches — CD54/74HC/HCT

HC/HCT75
HC/HCT259
HC/HCT373 •
HC/HCT533 •
HC/HCT563 •
HC/HCT573 •

Monostable

HC/HCT123
HC/HCT221
HC/HCT423
HC/HCT4538 †

Registers

Shift — CD54/74HC/HCT

HC/HCT164
HC/HCT165
HC/HCT166
HC/HCT194
HC/HCT195
HC/HCT299 •
HC/HCT597
HC/HCT4015
HC/HCT4094
HC/HCT40104 •

FIFO Buffer

HC/HCT40105
HC/HCT7030 •

Multiport

HC/HCT670

Counters

Binary Ripple — CD54/74HC/HCT

HC/HCT93
HC/HCT390
HC/HCT393
HC/HCT4020
HC/HCT4024
HC/HCT4040
HC/HCT4060
HC/HCT40103

Programmable

HC/HCT4059

Sychronous

HC/HCT160
HC/HCT161
HC/HCT162
HC/HCT163
HC/HCT190
HC/HCT191
HC/HCT192
HC/HCT193
HC/HCT4017
HC/HCT4510
HC/HCT4516
HC/HCT4518
HC/HCT4520
HC/HCT40102

Digital Multiplexers — CD54/74HC/HCT

HC/HCT151
HC/HCT153
HC/HCT157
HC/HCT158
HC/HCT251
HC/HCT253 •
HC/HCT257 •
HC/HCT258
HC/HCT354 •
HC/HCT356 •

Phase Locked Loops

HC/HCT297
HC/HCT4046A
HC/HCT7046A

Bilateral Switches

HC/HCT4016△
HC/HCT4066△
HC/HCT4316△

Analog Multiplexers/ Demultiplexers

HC/HCT4051
HC/HCT4052
HC/HCT4053
HC/HCT4067
HC/HCT4051
HC/HCT4352
HC/HCT4353

Interface Circuits

BUS Transceivers

HC/HCT242 •
HC/HCT243 •
HC/HCT245 •
HC/HCT640 •
HC/HCT643 •
HC/HCT646 •
HC/HCT647 •
HC/HCT648 •
HC/HCT649 •
HC/HCT651 •
HC/HCT652 •
HC/HCT653 •
HC/HCT654 •
HC/HCT7038 •

Arithmetic Circuits

Adders/ Comparators — CD54/74HC/HCT

HC/HCT85
HC/HCT283
HC/HCT583
HC/HCT688

ALU/Rate Multipliers

HC/HCT181
HC/HCT182

Parity Generator/Checker

HC/HCT280

Display Drivers

For LCD Drive — CD54/74HC/HCT

HC/HCT4543
See Decoders/ Encoders

For LED Drive

HC/HCT4511

* Open Collector
△ Quad type
• With Bus Driver output stage
† Precision type

High-Speed CMOS Logic ICs

CD54/74HC/HCT Series (Continued)

Function Selection Chart

Type CD54/74	Function/Description	Classification	No. of Pins
	NAND/NOR Gates		
HC/HCT00	Quad 2-Input NAND Gate	SSI	14
HC/HCT02	Quad 2-Input NOR Gate	SSI	14
HC/HCT03	Quad 2-Input NAND Gate with Open Drain	SSI	14
HC/HCT10	Triple 3-Input NAND Gate	SSI	14
HC/HCT20	Dual 4-Input NAND Gate	SSI	14
HC/HCT27	Triple 3-Input NOR Gate	SSI	14
HC/HCT30	8-Input NAND Gate	SSI	14
HC/HCT4002	Dual 4-Input NOR Gate	SSI	14
	AND/OR/EXCLUSIVE-OR Gates		
HC/HCT08	Quad 2-Input AND Gate	SSI	14
HC/HCT11	Triple 3-Input AND Gate	SSI	14
HC/HCT21	Dual 4-Input AND Gate	SSI	14
HC/HCT32	Quad 2-Input OR Gate	SSI	14
HC/HCT86	Quad 2-Input EXCLUSIVE-OR Gate	SSI	14
HC/HCT4075	Triple 3-Input OR Gate	SSI	14
HC7266	Quad Exclusive NOR Gate	SSI	14
	Inverters/Buffers/Bus Drivers		
HC/HCT04	Hex Inverter/Buffer	SSI	14
HCU04	Hex Inverter (Unbuffered)	SSI	14
HC/HCT125*	Quad 3-State Buffer	MSI	14
HC/HCT126*	Quad 3-State Buffer	MSI	14
HC/HCT240*	Octal Buffer/Line Driver; 3-State; Inverting	MSI	20
HC/HCT241*	Octal Buffer/Line Driver; 3-State	MSI	20
HC/HCT244*	Octal Buffer/Line Driver; 3-State	MSI	16
HC/HCT365*	Hex Buffer/Line Driver; 3-State	MSI	16
HC/HCT366*	Hex Buffer/Line Driver; 3-State; Inverting	MSI	16
HC/HCT367*	Hex Buffer/Line Driver; 3-State	MSI	16
HC/HCT368*	Hex Buffer/Line Driver; 3-State; Inverting	MSI	16
HC/HCT540*	Octal Buffer/Line Driver; 3-State; Inverting	MSI	20
HC/HCT541*	Octal Buffer/Line Driver; 3-State	MSI	20
HC4049	Hex Inverting HIGH-to-LOW Level Shifter	SSI	16
HC4050	Hex HIGH-to-LOW Level Shifter	SSI	16
	Flip-Flops		
HC/HCT73	Dual JK Flip-Flop with Reset; Negative-Edge Trigger	FF	14
HC/HCT74	Dual D-Type Flip-Flop with Set and Reset; Positive-Edge Trigger	FF	14
HC/HCT107	Dual JK Flip-Flop with Reset; Negative-Edge Trigger	FF	14
HC/HCT109	Dual JK Flip-Flop with Set and Reset; Positive-Edge Trigger	FF	16
HC/HCT112	Dual JK Flip-Flop with Set and Reset; Negative-Edge Trigger; 3-State	FF	16
HC/HCT173*	Quad D-Type Flip-Flop with Set and Reset; Positive-Edge Trigger; 3-State	MSI	16
HC/HCT174	Hex D-Type Flip-Flop with Reset; Positive-Edge Trigger	MSI	16
HC/HCT175	Quad D-Type Flip-Flop with Reset; Positive-Edge Trigger	MSI	16
HC/HCT273	Octal D-Type Flip-Flop with Reset; Positive-Edge Trigger	MSI	20
HC/HCT374*	Octal D-Type Flip-Flop; Positive-Edge Trigger; 3-State	MSI	20
HC/HCT377	Octal D-Type Flip-Flop with Data Enable; Positive-Edge Trigger	MSI	20
HC/HCT534*	Octal D-Type Flip-Flop; Positive-Edge Trigger; 3-State; Inverting	MSI	20
HC/HCT564*	Octal D-Type Flip-Flop; Positive-Edge Trigger; 3-State; Inverting	MSI	20
HC/HCT574*	Octal D-Type Flip-Flop; Positive-Edge; 3-State	MSI	20
	Shift/FIFO Buffer/Multiport Registers		
HC/HCT164	8-Bit Serial-In/Parallel-Out Shift Register	MSI	14
HC/HCT165	8-Bit Parallel-In/Serial-Out Shift Register	MSI	16
HC/HCT166	8-Bit Parallel/Serial-In Serial Out Shift Register	MSI	16
HC/HCT194	4-Bit Bidirectional Universal Shift Register	MSI	16
HC/HCT195	4-Bit Parallel Access Shift Register	MSI	16
HC/HCT299*	8-Bit Universal Shift Register; 3-State	MSI	20

* Types with a bus driver output stage.

CD54/74HC/HCT Series (Continued)

Function Selection Chart (Continued)

Type CD54/74	Function/Description	Classification	No. of Pins
	Shift/FIFO Buffer/Multiport Registers (Continued)		
HC/HCT597	8-Bit Shift Register With Input Latch	MSI	16
HC/HCT670*	4 x 4 Register File; 3-State	MSI	16
HC/HCT4015	Dual 4-Stage Static Shift Register	MSI	16
HC/HCT4094	8-Stage Shift-and-Store Bus Register; 3-State	MSI	16
HC/HCT7030*	9-Bit x 64 Word FIFO Register; 3-State	MSI	28
HC/HCT40104*	4-Bit Bidirectional Universal Shift Register; 3-State	MSI	16
HC/HCT40105	4 Bits x 16 Words FIFO Register	MSI	16
	Arithmetic Circuits		
HC/HCT85	4-Bit Magnitude Comparator	MSI	16
HC/HCT181	4-Bit Arithmetic Logic Unit	MSI	24
HC/HCT182	Look-Ahead Carry Generator	MSI	16
HC/HCT280	9-Bit Odd/Even Parity Generator/Checker	MSI	14
HC/HCT283	4-Bit Binary Full Adder With Fast Carry	MSI	16
HC/HCT583	4-Bit BCD Full Adder with Fast Carry	MSI	16
HC/HCT688	8-Bit Magnitude Comparator	MSI	20
	Counters		
HC/HCT93	4-Binary Ripple Counter	MSI	14
HC/HCT160	Presettable Synchronous BCD Decade Counter; Asynchronous Reset	MSI	16
HC/HCT161	Presettable Synchronous 4-Bit Binary Counter; Aysnchronous Reset	MSI	16
HC/HCT162	Presettable Synchronous BCD Decade Counter; Synchronous Reset	MSI	16
HC/HCT163	Presettable Synchronous 4-Bit Binary Counter; Synchronous Reset	MSI	16
HC/HCT190	Presettable Synchronous BCD Decade Up/Down Counter	MSI	16
HC/HCT191	Presettable Synchronous 4-Bit Binary Up/Down Counter	MSI	16
HC/HCT192	Presettable Synchronous BCD Decade Up/Down Counter	MSI	16
HC/HCT193	Presettable Synchronous 4-Bit Binary Up/Down Counter	MSI	16
HC/HCT390	Dual Decade Ripple Counter	MSI	16
HC/HCT393	Dual 4-Bit Binary Ripple Counter	MSI	14
HC/HCT4017	Decade Counter/Divider with 10 Decoded Outputs	MSI	16
HC/HCT4020	14-Stage Binary Ripple Counter	MSI	16
HC/HCT4024	7-Stage Binary Ripple Counter	MSI	16
HC/HCT4040	12-Stage Binary Ripple Counter	MSI	16
HC/HCT4059	Programmable Divide by "N" Counter	MSI	24
HC/HCT4060	14-Stage Binary Ripple Counter with Oscillator	MSI	16
HC/HCT4510	Presettable BCD Up/Down Counter	MSI	16
HC/HCT4516	Presettable Binary Up/Down Counter	MSI	16
HC/HCT4518	Dual Synchronous BCD Counter	MSI	16
HC/HCT4520	Dual 4-Bit Synchronous Binary Counter	MSI	16
HC/HCT40102	Synchronous 2-Decade BCD Down Counter	MSI	16
HC/HCT40103	8-Bit Synchronous Binary Down Counter	MSI	16
	One-Shot Multivibrators		
HC/HCT123	Dual Retriggerable Monostable Multivibrator with Reset	MSI	16
HC/HCT221	Dual Monostable Multivibrator with Reset	MSI	16
HC/HCT423	Dual Retriggerable Monostable Multivibrator with Reset	MSI	16
HC/HCT4538	Dual Retriggerable Precision Monostable Multivibrator	MSI	16
	Analog and Digital Multiplexers/Demultiplexers		
HC/HCT151	8-Input Multiplexer	MSI	16
HC/HCT153	Dual 4-Input Multiplexer	MSI	16
HC/HCT157	Quad 2-Input Multiplexer	MSI	16
HC/HCT158	Quad 2-Input Multiplexer; Inverting	MSI	16
HC/HCT251	8-Input Multiplexer; 3-State	MSI	16
HC/HCT253*	Dual 4-Input Multiplexer; 3-State	MSI	16
HC/HCT257*	Quad 2-Input Multiplexer; 3-State; Non-Inverting Outputs	MSI	16
HC/HCT258	Quad 2-Input Multiplexer; 3-State; Inverting Outputs	MSI	16
HC/HCT354*	8-Input Multiplexer/Register; 3-State	MSI	20
HC/HCR356*	8-Input Multiplexer/Register; 3-State	MSI	20

* Type with a bus-driver output stage.

CD54/74HC/HCT Series (Continued)

Function Selection Chart (Continued)

Type CD54/74	Function/Description	Classification	No. of Pins
	Analog and Digital Multiplexers/Demultiplexers (Continued)		
HC/HCT4051	8-Channel Analog Multiplexer/Demultiplexer	MSI	16
HC/HCT4052	Dual 4-Channel Analog Multiplexer/Demultiplexer	MSI	16
HC/HCT4053	Triple 2-Channel Analog Multiplexer/Demultiplexer	MSI	16
HC/HCT4067	16-Channel Analog Multiplexer/Demultiplexer	MSI	24
HC/HCT4351	Dual 4-Channel Analog Multiplexer/Demultiplexer with Latch	MSI	20
HC/HCT4352	Triple 2-Channel Analog Multiplexer/Demultiplexer with Latch	MSI	20
HC/HCT4353	16-Channel Analog Multiplexer/Demultiplexer with Latch	MSI	20
	Decoders/Encoders		
HC/HCT42	BCD to Decimal Decoder (1-of-10)	MSI	16
HC/HCT137	3-to-8-Line Decoder with Latch; Inverting	MSI	16
HC/HCT138	3-to-8-Line Decoder/Demultiplexer; Inverting	MSI	16
HC/HCT139	Dual 2-to-4-Line Decoder/Demultiplexer	MSI	16
HC/HCT147	10-to-4-Line Priority Encoder	MSI	16
HC/HCT154	4-to-16-Line Decoder/Demultiplexer	MSI	24
HC/HCT237	3-to-8-Line Decoder/Demultiplexer with Address Latches	MSI	16
HC/HCT238	3-to-8-Line Decoder/Demultiplexer Non-Inverting	MSI	16
HC/HCT4511	BCD-to-7-Segment Latch/Decoder/Driver	MSI	16
HC/HCT4514	4-to-16-Line Decoder/Demultiplexer with Input Latches	MSI	24
HC/HCT4515	4-to-16-Line Decoder/Demultiplexer with Input Latches	MSI	24
HC/HCT4543	BCD-to-7-Segment Latch/Decoder/Driver for LCDs	MSI	16
	Analog Switches		
HC/HCT4016	Quad Bilateral Switch	SSI	14
HC/HCT4066	Quad Bilateral Switch	SSI	14
HC/HCT4316	Quad Analog Switch	MSI	16
	Bus Transceivers		
HC/HCT242*	Quad Bus Transceiver; 3-State; Inverting	MSI	14
HC/HCT243*	Quad Bus Transceiver; 3-State	MSI	14
HC/HCT245*	Octal Bus Transceiver; 3-State	MSI	20
HC/HCT640*	Octal Bus Transceiver; 3-State; Inverting	MSI	20
HC/HCT643*	Octal Bus Transceiver; 3-State; True/Inverting	MSI	20
HC/HCT646*	Octal Bus Transceiver; 3-State	MSI	24
HC/HCT648*	Octal Bus Transceiver; 3-State; Inverting	MSI	24
HC/HCT7038*	9-Bit Bus Transceiver with Latch	MSI	24
	Schmitt Triggers		
HC/HCT14	Hex Inverting Schmitt Trigger	SSI	14
HC/HCT132	Quad 2-Input NAND Schmitt Trigger	SSI	14
	Latches		
HC/HCT75	Dual 2-Input Bistable Transparent Latch	FF	16
HC/HCT259	8-Bit Adressable Latch	MSI	16
HC/HCT373*	Octal Transparent Latch; 3-State	MSI	20
HC/HCT533*	Octal Transparent Latch; 3-State; Inverting	MSI	20
HC/HCT563*	Octal Transparent Latch; 3-State; Inverting	MSI	20
HC/HCT573*	Octal Transparent Latch; 3-State	MSI	20
	Phase-Locked Loops (PLL)		
HC/HCT297	Digital Phase-Locked Loop Filter	MSI	16
HC/HCT4046A	Phase-Locked Loop with VCO	MSI	16
HC/HCT7046A	Phase-Locked Loop with In-Lock Detection	MSI	16

* Type with a bus-driver output stage.