

**HIGH-SPEED
CMOS LOGIC**

**TYPES SN54HC696 THRU SN54HC699, SN74HC696 THRU SN74HC699
SYNCHRONOUS UP/DOWN COUNTERS WITH OUTPUT REGISTERS
AND MULTIPLEXED 3-STATE OUTPUTS**

D2804, MARCH 1984

- 4-Bit Counters/Registers
- Multiplexed Outputs for Counter or Latched Data
- High-Current 3-State Outputs Drive Bus Lines Directly or up to 15 LSTTL Loads
- 'HC696 . . . Decade Counter, Direct Clear
'HC697 . . . Binary Counter, Direct Clear
'HC698 . . . Decade Counter, Synchronous Clear
'HC699 . . . Binary Counter, Synchronous Clear
- Package Options Include Both Plastic and Ceramic Chip Carriers in Addition to Plastic and Ceramic DIPs
- Dependable Texas Instruments Quality and Reliability

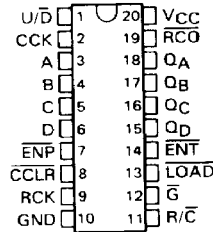
description

These high-speed CMOS devices incorporate synchronous up/down counters, four-bit D-type registers, and quadruple two-line to one-line multiplexers with three-state outputs in a single 20-pin package. The up/down counters are programmable from the data inputs and feature enable \bar{P} (ENP) and enable \bar{T} (ENT) and ripple-carry output (RCO) for easy expansion. The register/counter select input (R/\bar{C}) selects the counter when low and the register when high for the three-state outputs Q_A , Q_B , Q_C , and Q_D .

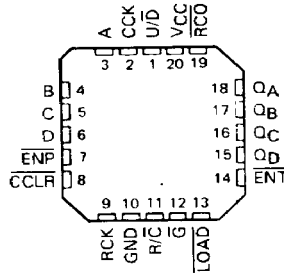
Both the counter clock (CCK) and register clock (RCK) are positive-edge triggered. The counter clear (\bar{CCLR}) is active low and asynchronous on the 'HC696 and 'HC697, synchronous on the 'HC698 and 'HC699.

The SN54HC696 through SN54HC699 are characterized for operation over the full military range of -55°C to 125°C . The SN74HC696 through SN74HC699 are characterized for operation from -40°C to 85°C .

SN54HC696 THRU SN54HC699 . . . J PACKAGE
SN74HC696 THRU SN74HC699 . . . J OR N PACKAGE
(TOP VIEW)



SN54HC696 THRU SN54HC699 . . . FH OR FK PACKAGE
SN74HC696 THRU SN74HC699 . . . FH OR FN PACKAGE
(TOP VIEW)



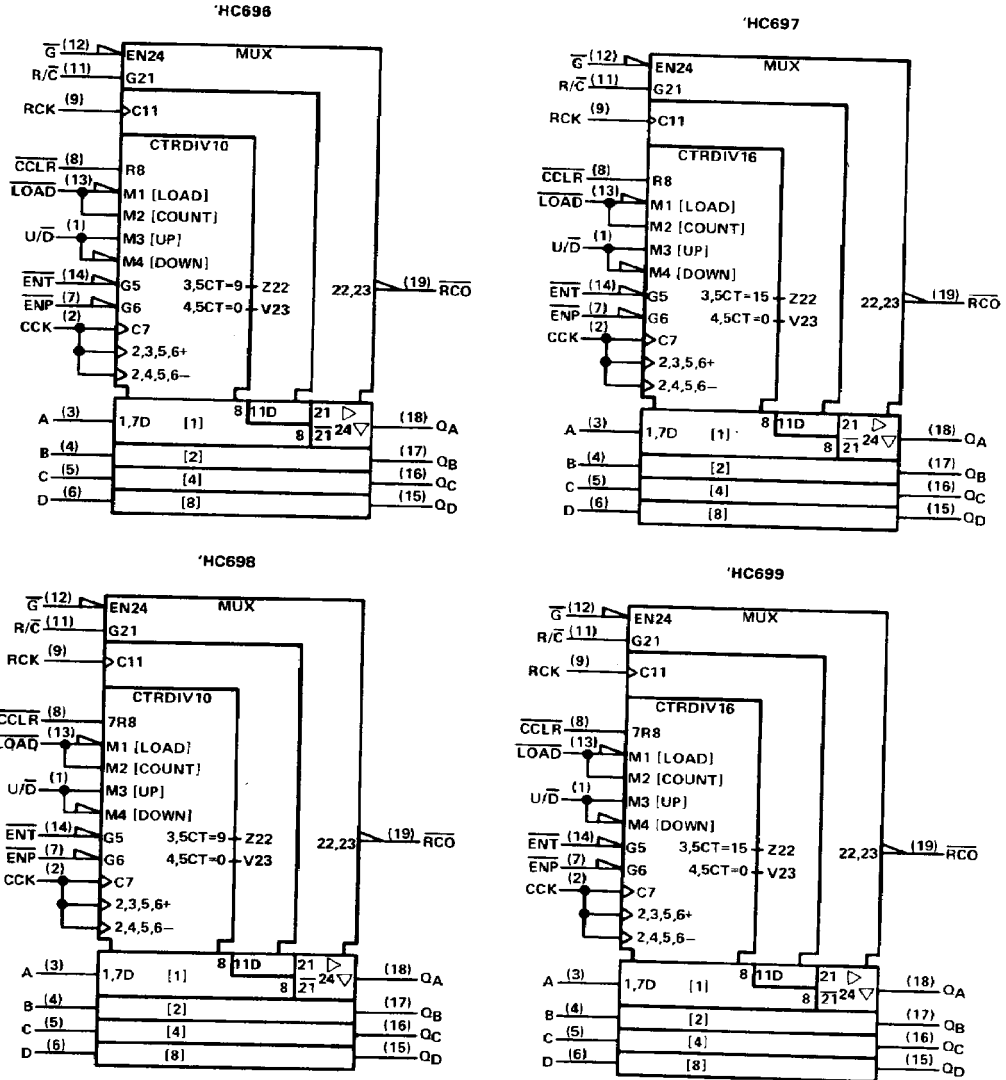
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logic symbols

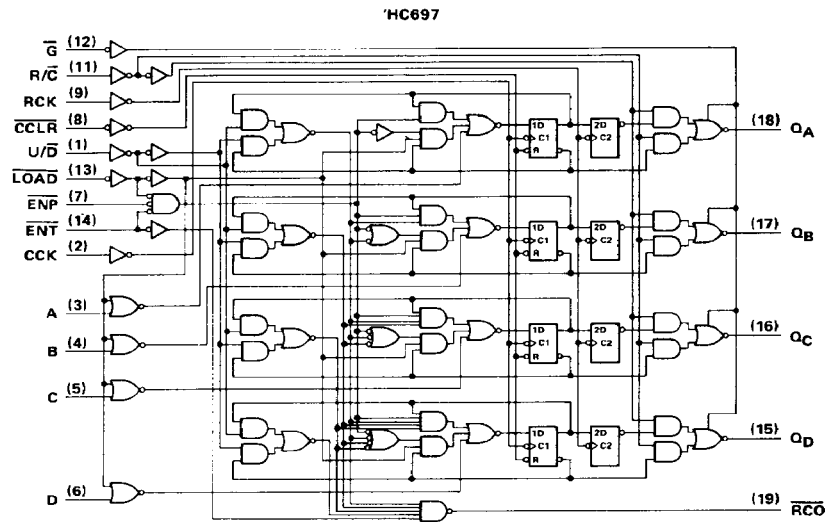
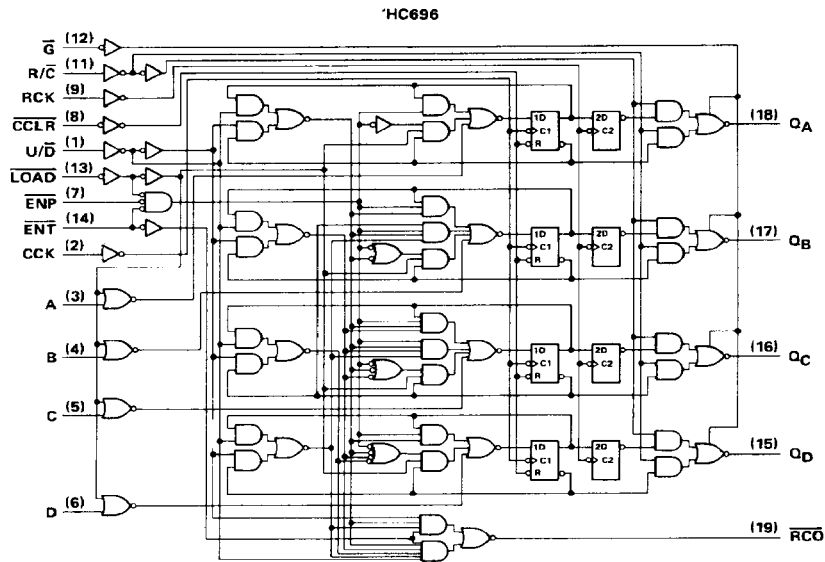
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logic diagrams (positive logic)



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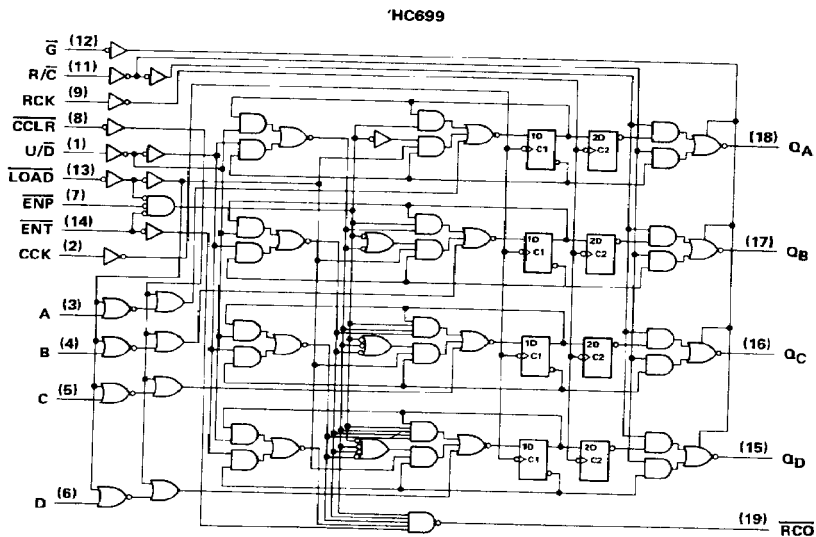
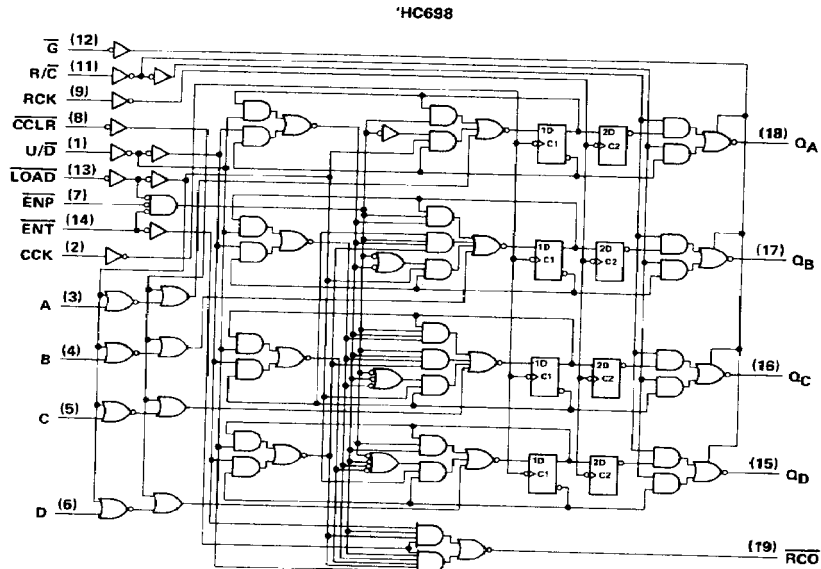
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logic diagrams (positive logic)

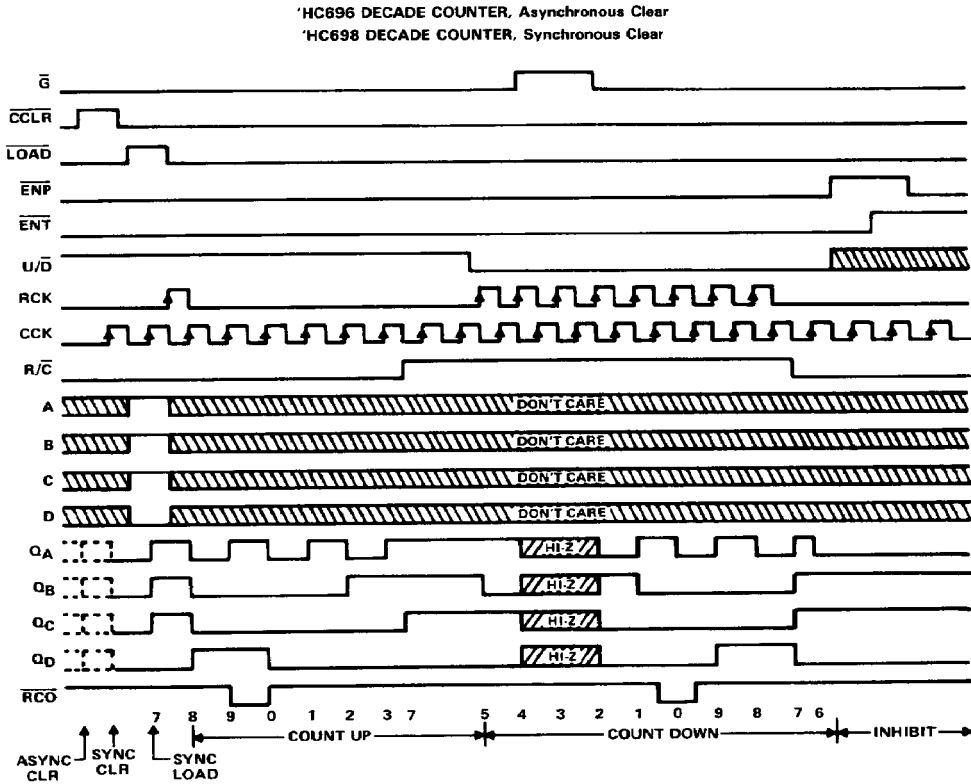
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**TYPES SN54HC696, SN54HC698, SN74HC696, SN74HC698
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typical operating sequences

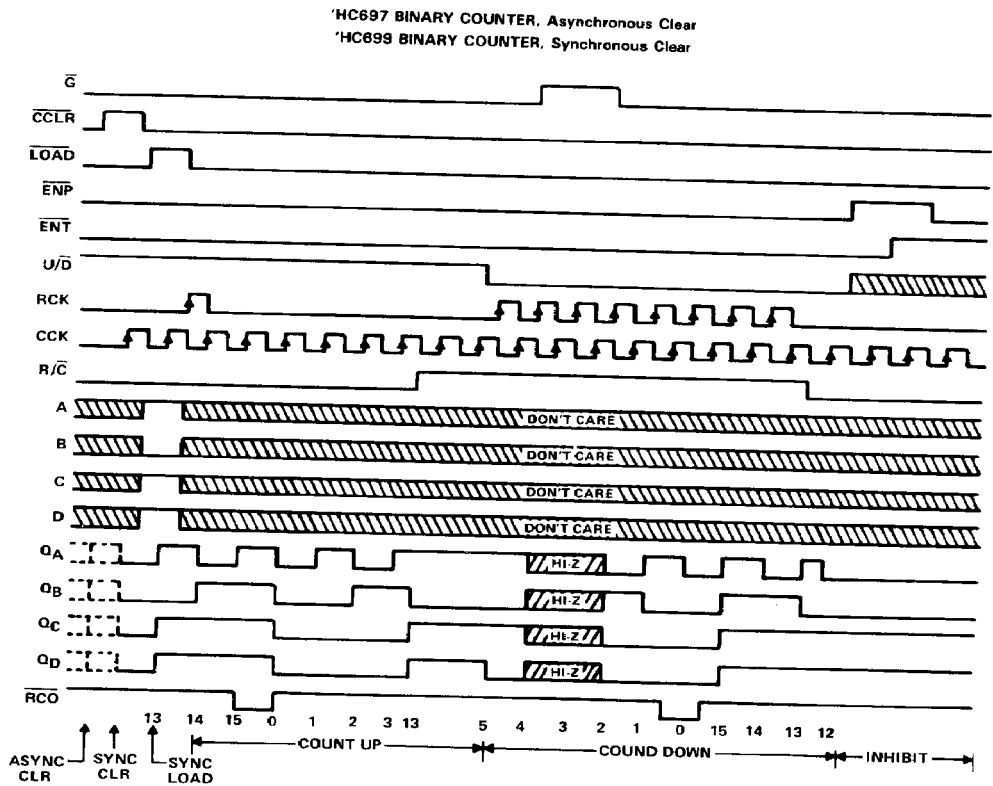


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maximum ratings, recommended operating conditions, and electrical characteristics

See Table III, page 2-8.

switching characteristics over recommended operating free-air temperature range (unless otherwise noted), $C_L = 50$ pF (see Note 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V _{CC}	T _A = 25 °C			SN54HC696 SN54HC697		SN74HC696 SN74HC697		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t _{pd}	CCK↑	\overline{RCO}	2 V	115							ns
			4.5 V	23							
			6 V	20							
t _{pd}	\overline{ENT}	\overline{RCO}	2 V	55							ns
			4.5 V	11							
			6 V	9							
t _{pd}	$\overline{CCLR}↓$	\overline{RCO}	2 V	115							ns
			4.5 V	23							
			6 V	20							
t _{pd}	CCK↑	Any Q	2 V	85							ns
			4.5 V	17							
			6 V	14							
t _{pd}	RCK↑	Any Q	2 V	85							ns
			4.5 V	17							
			6 V	14							
t _{PHL}	$\overline{CCLR}↓$	Any Q	2 V	90							ns
			4.5 V	18							
			6 V	15							
t _{pd}	R/ \overline{C}	Any Q	2 V	70							ns
			4.5 V	14							
			6 V	12							
t _{en}	$\overline{G}↑$	Any Q	2 V	70							ns
			4.5 V	14							
			6 V	12							
t _{dis}	$\overline{G}↑$	Any Q	2 V	95							ns
			4.5 V	19							
			6 V	16							
t _t		Any	2 V	38							ns
			4.5 V	8							
			6 V	6							

NOTE 1: For load circuits and voltage waveforms, see page 1-14.

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PARAMETER	FROM (INPUT)	TO (OUTPUT)	V _{CC}	T _A = 25 °C			SN54HC698 SN54HC699		SN74HC698 SN74HC699		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t _{pd}	CCK↑	RCO	2 V	115							ns
			4.5 V	23							
			6 V	20							
t _{pd}	ENT	RCO	2 V	55							ns
			4.5 V	11							
			6 V	9							
t _{pd}	CCK↑	Any Q	2 V	95							ns
			4.5 V	19							
			6 V	16							
t _{pd}	RCK↑	Any Q	2 V	85							ns
			4.5 V	17							
			6 V	14							
t _{pd}	R/C	Any Q	2 V	70							ns
			4.5 V	14							
			6 V	12							
t _{en}	G↑	Any Q	2 V	70							ns
			4.5 V	74							
			6 V	12							
t _{dis}	G↑	Any Q	2 V	95							ns
			4.5 V	19							
			6 V	16							
t _t		Any	2 V	38							ns
			4.5 V	8							
			6 V	6							

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