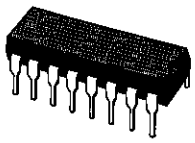
上海双岭电子有限公司

CC4518
CC4520

DUAL UP-COUNTERS

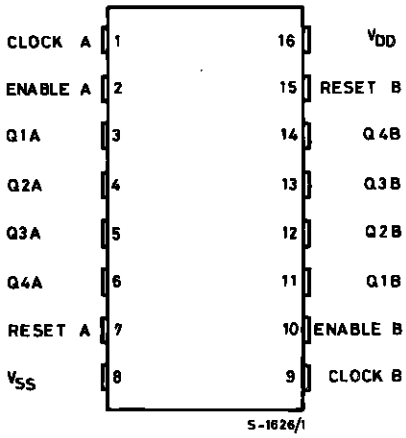
CC4518 DUAL BCD UP-COUNTER

CC4520 DUAL BINARY UP-COUNTER



- MEDIUM-SPEED OPERATION – 6MHz TYP. CLOCK FREQUENCY AT 10V
- POSITIVE - OR NEGATIVE - EDGE TRIGGERING
- SYNCHRONOUS INTERNAL CARRY PROPAGATION
- QUIESCENT CURRENT SPECIFIED TO 20V FOR HCC DEVICE
- 5V, 10V, AND 15V PARAMETRIC RATINGS
- INPUT CURRENT OF 100nA AT 18V AND 25°C FOR HCC DEVICE
- 100% TESTED FOR QUIESCENT CURRENT
- MEETS ALL REQUIREMENTS OF JEDEC TENTATIVE STANDARD N° 13A, "STANDARD SPECIFICATIONS FOR DESCRIPTION OF "B" SERIES CMOS DEVICES"

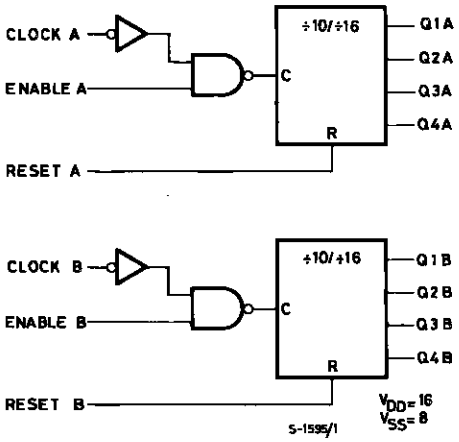
PIN CONNECTIONS



DESCRIPTION

The **CC4518/4520** (extended temperature range) and **CC4518/4520** (intermediate temperature range) are monolithic integrated circuits, available in 16-lead dual in-line plastic or ceramic package and plastic micro package. The **CC4518** Dual BCD Up Counter and **CC4520** Dual Binary Up Counter each consist of two identical, internally synchronous 4-stage counters. The counter stages are D-type flip-flops having interchangeable Clock and Enable lines for incrementing on either the positive-going or negative-going transition. For single-unit operation the Enable input is maintained "high" and the counter advances on each positive-going transition of the Clock. The counters are cleared by high levels on their Reset lines. The counter can be cascaded in the ripple mode by connecting Q4 to the enable input of the subsequent counter while the clock input of the latter is held low.

FUNCTIONAL DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{DD}*	Supply Voltage :	– 0.5 to + 20	V
V_i	Input Voltage	– 0.5 to V_{DD} + 0.5	V
I_I	DC Input Current (any one input)	± 10	mA
P_{tot}	Total Power Dissipation (per package) Dissipation per Output Transistor for T_{op} = Full Package-temperature Range	200 100	mW mW
T_{op}	Operating Temperature :	– 55 to + 125	°C
T_{stg}	Storage Temperature	– 65 to + 150	°C

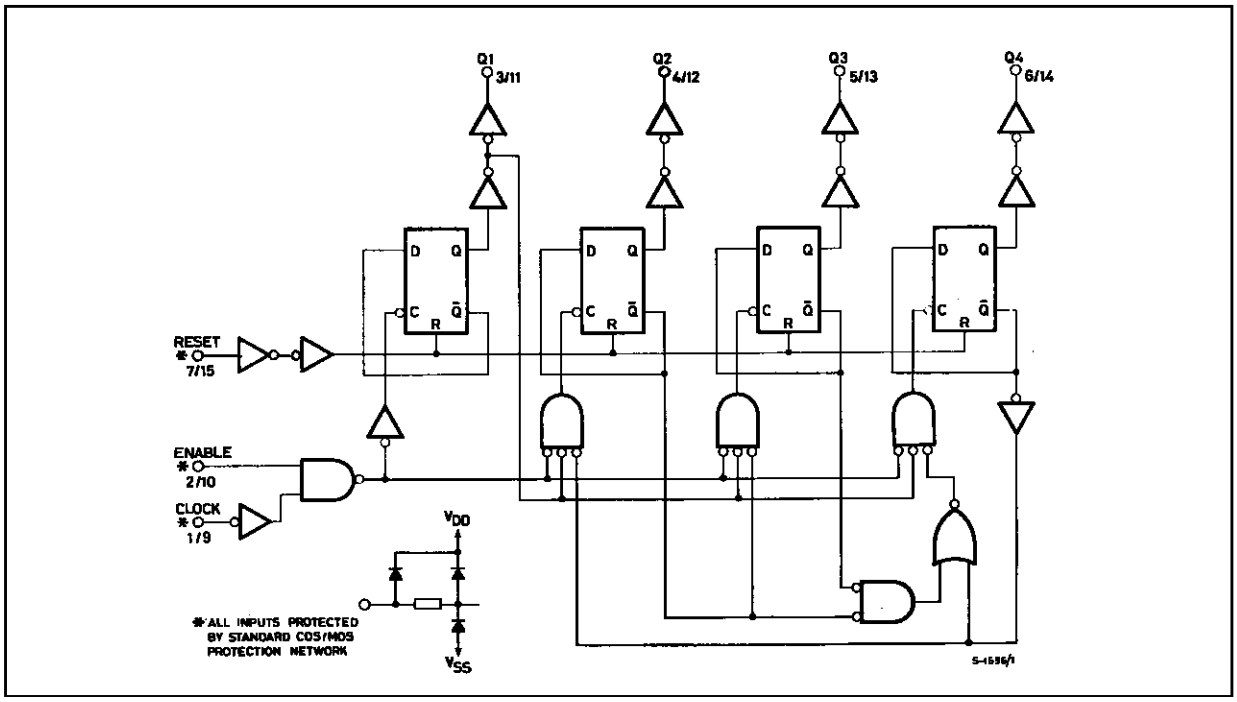
Stresses above those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for external periods may affect device reliability.
* All voltage values are referred to V_{SS} pin voltage.

RECOMMENDED OPERATING CONDITIONS

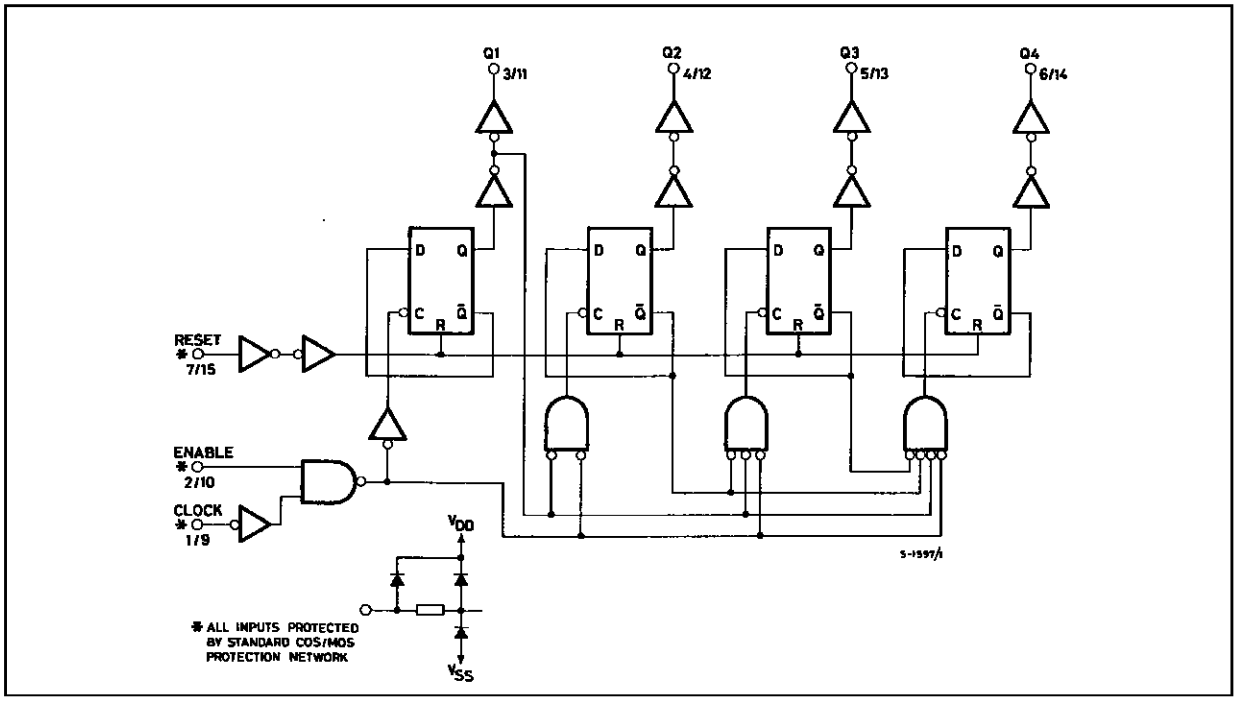
Symbol	Parameter	Value	Unit
V_{DD}	Supply Voltage :	3 to 18	V
V_I	Input Voltage	0 to V_{DD}	V
T_{op}	Operating Temperature :	– 55 to + 125	°C

LOGIC DIAGRAMS (for one of two identical counter)

Decade Counter for 4518B.



Binary Counter for 4520B.

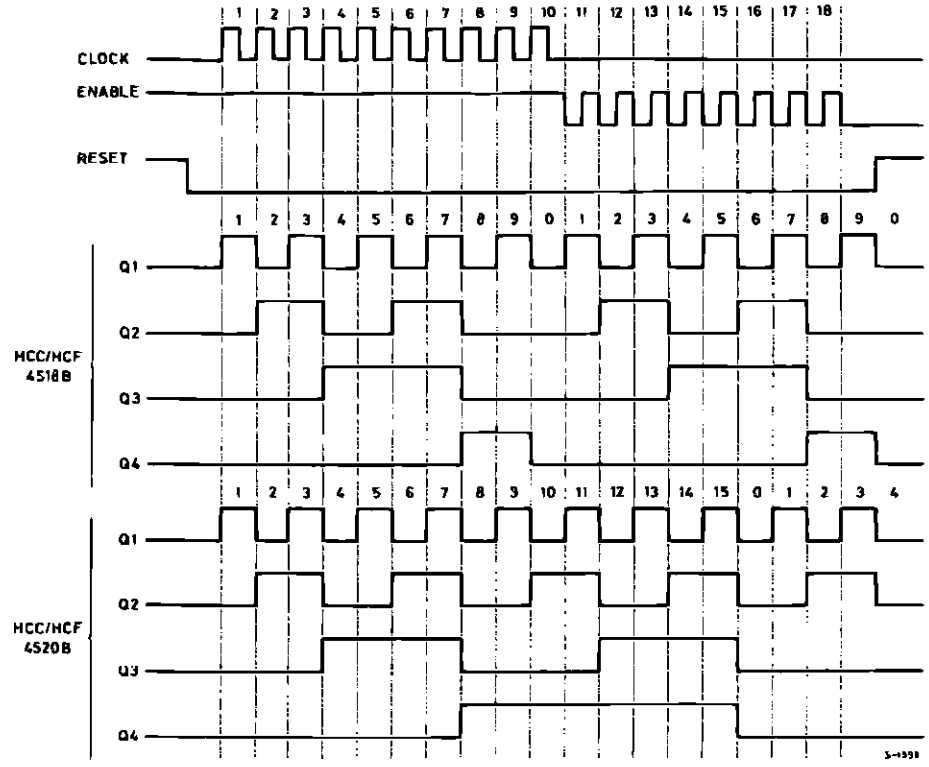


TRUTH TABLE

Clock	Enable	Reset	Action
_/‾	1	0	Increment Counter
0	‾_	0	Increment Counter
‾_	X	0	No Change
X	_/‾	0	No Change
_/‾	0	0	No Change
1	‾_	0	No Change
X	X	1	Q1 Thru Q4 = 0

X = Don't Care Logic 1 = High State Logic 0 = Low

TIMING DIAGRAM



STATIC ELECTRICAL CHARACTERISTICS (over recommended operating conditions)

Symbol	Parameter	Test Conditions				Value							Unit
		V_I (V)	V_O (V)	$\|I_O\|$ (μA)	V_{DD} (V)	T_{Low}*		25°C			T_{High}*		
						Min.	Max.	Min.	Typ.	Max.	Min.	Max.	
I_L	Quiescent Current	0/ 5			5		5		0.04	5		150	μA
		0/10			10		10		0.04	10		300	
		0/15			15		20		0.04	20		600	
		0/18			18		100		0.08	100		3000	
V_{OH}	Output High Voltage	0/ 5		< 1	5	4.95		4.95			4.95		V
		0/10		< 1	10	9.95		9.95			9.95		
		0/15		< 1	15	14.95		14.95			14.95		
V_{OL}	Output Low Voltage	5/0		< 1	5		0.05			0.05		0.05	V
		10/0		< 1	10		0.05			0.05		0.05	
		15/0		< 1	15		0.05			0.05		0.05	
V_{IH}	Input High Voltage		0.5/4.5	< 1	5	3.5		3.5			3.5		V
			1/9	< 1	10	7		7			7		
			1.5/13.5	< 1	15	11		11			11		
V_{IL}	Input Low Voltage		4.5/0.5	< 1	5		1.5			1.5		1.5	V
			9/1	< 1	10		3			3		3	
			13.5/1.5	< 1	15		4			4		4	
I_{OH}	Output Drive Current	0/ 5	2.5		5	– 2		– 1.6	– 3.2		– 1.15		mA
		0/ 5	4.6		5	– 0.64		– 0.51	– 1		– 0.36		
		0/10	9.5		10	– 1.6		– 1.3	– 2.6		– 0.9		
		0/15	13.5		15	– 4.2		– 3.4	– 6.8		– 2.4		
I_{OL}	Output Sink Current	0/ 5	0.4		5	0.64		0.51	1		0.36		mA
		0/10	0.5		10	1.6		1.3	2.6		0.9		
		0/15	1.5		15	4.2		3.4	6.8		2.4		
I_{IH}, I_{IL}	Input Leakage Current	0/18	Any Input		18		± 0.1		$\pm 10^{-5}$	± 0.1		± 1	μA
C_I	Input Capacitance		Any Input						5	7.5			pF

* T_{Low} = – 55°C for **HCC** device : – 40°C for **HCF** device.
* T_{High} = + 125°C for **HCC** device : + 85°C for **HCF** device.
The Noise Margin for both "1" and "0" level is : 1V min. with V_{DD} = 5V, 2V min. with V_{DD} = 10V, 2.5V min. with V_{DD} = 15V.

DYNAMIC ELECTRICAL CHARACTERISTICS (T_{amb} = 25°C, C_L = 50pF, R_L = 200kΩ, typical temperature coefficient for all V_{DD} = 0.3%/°C values, all input rise and fall time = 20ns)

Symbol	Parameter	Test Conditions		Value			Unit
			V_{DD} (V)	Min.	Typ.	Max.	
t_{PLH}, t_{PHL}	Propagation Delay Time (clock or enable to output)		5		280	560	ns
			10		115	230	
			15		80	160	
t_{PLH}, t_{PHL},	Propagation Delay Time (reset to output)		5		330	650	ns
			10		130	225	
			15		90	170	
t_{TLH} , t_{THL}	Transition Time		5		100	200	ns
			10		50	100	
			15		40	80	
t_W	Clock Pulse Width		5	200	100		ns
			10	100	50		
			15	70	35		
t_W	Reset Pulse Width		5	250	125		ns
			10	110	55		
			15	80	40		
t_W	Enable Pulse Width		5	400	200		ns
			10	200	100		
			15	140	70		
t_r, t_f	Clock or Enable Rise and Fall Time		5			15	µs
			10			15	
			15			5	
f_{max}	Maximum Clock Frequency		5	1.5	3		MHz
			10	3	6		
			15	4	8		
t_r, t_f	Clock Input Rise or Fall Time		5			15	µs
			10			5	
			15			5	