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Jameco Part Number 13565NSC



CD4518BM/CD4518BC, CD4520BM/CD4520BC Dual Synchronous Up Counters

General Description

The CD4518BM/CD4518BC dual BCD counter and the CD4520BM/CD4520BC dual binary counter are implemented with complementary MOS (CMOS) circuits constructed with N- and P-channel enhancement mode transistors.

Each counter consists of two identical, independent, synchronous, 4-stage counters. The counter stages are toggle flip-flops which increment on either the positive-edge of CLOCK or negative-edge of ENABLE, simplifying cascading of multiple stages. Each counter can be asynchronously cleared by a high level on the RESET

line. All inputs are protected against static discharge by diode clamps to both V_{DD} and V_{SS} .

Features

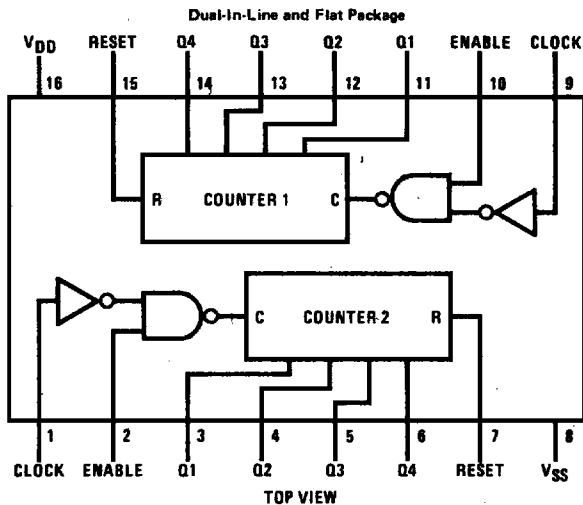
- Wide supply voltage range 3.0V to 15V
- High noise immunity 0.45 V_{DD} (typ.)
- Low power TTL compatibility fan out of 2 driving 74L or 1 driving 74LS
- 6 MHz counting rate (typ.) at $V_{DD} = 10V$

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

Connection Diagram



Order Number CD4518BMJ,
CD4518BCJ, CD4520BMJ
or CD4520BCJ
See NS Package J16A

Order Number CD4518BMN,
CD4518BCN, CD4520BMN
or CD4520BCN
See NS Package N16E

TLP1086-1

CD4518BM/CD4518BC, CD4520BM/CD4520BC

Absolute Maximum Ratings

(Notes 1 and 2)

V _{DD} Supply Voltage	-0.5V to +18V
V _{IN} Input Voltage	-0.5V to V _{DD} + 0.5V
T _S Storage Temperature Range	-85°C to +150°C
P _D Package Dissipation	500 mW
T _L Lead Temperature (Soldering, 10 seconds)	260°C

Recommended Operating Conditions

(Note 2)

V _{DD} Supply Voltage	3V to 15V
V _{IN} Input Voltage	0V to V _{DD}
T _A Operating Temperature Range	-55°C to +125°C
	CD4518BM, CD4520BM
	CD4518BC, CD4520BC
	-40°C to +85°C

DC Electrical Characteristics CD4518BM/CD4520BM (Note 2)

SYM	PARAMETER	CONDITIONS	-55°C		25°C			125°C		UNITS
			MIN	MAX	MIN	TYP	MAX	MIN	MAX	
I _{DD}	Quiescent Device Current	V _{DD} = 5V		5		0.01	5		150	μA
		V _{DD} = 10V		10		0.01	10		300	μA
		V _{DD} = 15V		20		0.01	20		600	μA
V _{OL}	Low Level Output Voltage	I _O < 1 μA, V _{IH} = V _{DD} , V _{IL} = 0V								
		V _{DD} = 5V		0.05		0	0.05		0.05	V
		V _{DD} = 10V		0.05		0	0.05		0.05	V
V _{OH}	High Level Output Voltage	I _O < 1 μA, V _{IH} = V _{DD} , V _{IL} = 0V								
		V _{DD} = 5V	4.95		4.95	5		4.95		V
		V _{DD} = 10V	9.95		9.95	10		9.95		V
V _{IL}	Low Level Input Voltage	I _O < 1 μA								
		V _{DD} = 5V, V _O = 0.5V or 4.5V		1.5		2.25	1.5		1.5	V
		V _{DD} = 10V, V _O = 1V or 9V		3.0		4.5	3.0		3.0	V
V _{IH}	High Level Input Voltage	I _O < 1 μA								
		V _{DD} = 5V, V _O = 0.5V or 4.5V	3.5		3.5	2.75		3.5		V
		V _{DD} = 10V, V _O = 1V or 9V	7.0		7.0	5.5		7.0		V
I _{OL}	Low Level Output Current (Note 3)	V _{IH} = V _{DD} , V _{IL} = 0V								
		V _{DD} = 5V, V _O = 0.4V	0.64		0.51	0.88		0.36		mA
		V _{DD} = 10V, V _O = 0.5V	1.6		1.3	2.25		0.9		mA
I _{OH}	High Level Output Current (Note 3)	V _{IH} = V _{DD} , V _{IL} = 0V								
		V _{DD} = 5V, V _O = 4.6V	-0.64		-0.51	-0.88		-0.36		mA
		V _{DD} = 10V, V _O = 9.5V	-1.6		-1.3	-2.25		-0.9		mA
I _{IN}	Input Current	V _{DD} = 15V, V _{IN} = 0V		-0.1		-10 ⁻⁵	-0.1		-1.0	μA
		V _{DD} = 15V, V _{IN} = 15V		0.1		10 ⁻⁵	0.1		1.0	μA

DC Electrical Characteristics CD4518BC/CD4520BC (Note 2)

SYM	PARAMETER	CONDITIONS	-40°C		25°C			85°C		UNITS
			MIN	MAX	MIN	TYP	MAX	MIN	MAX	
I _{DD}	Quiescent Device Current	V _{DD} = 5V		20		0.01	20		150	μA
		V _{DD} = 10V		40		0.01	40		300	μA
		V _{DD} = 15V		80		0.01	80		600	μA
V _{OL}	Low Level Output Voltage	I _O < 1 μA, V _{IH} = V _{DD} , V _{IL} = 0V								
		V _{DD} = 5V		0.05		0	0.05		0.05	V
		V _{DD} = 10V		0.05		0	0.05		0.05	V
V _{OH}	High Level Output Voltage	I _O < 1 μA, V _{IH} = V _{DD} , V _{IL} = 0V								
		V _{DD} = 5V	4.95		4.95	5		4.95		V
		V _{DD} = 10V	9.95		9.95	10		9.95		V
V _{DD} = 15V		14.95		14.95	15		14.95		V	

DC Electrical Characteristics (Cont'd.) CD4518BC/CD4520BC (Note 2)

SYM	PARAMETER	CONDITIONS	-40°C		25°C			85°C		UNITS
			MIN	MAX	MIN	TYP	MAX	MIN	MAX	
V _{IL}	Low Level Input Voltage	I _O < 1 μA V _{DD} = 5V, V _O = 0.5V or 4.5V V _{DD} = 10V, V _O = 1V or 9V V _{DD} = 15V, V _O = 1.5V or 13.5V		1.5		2.25	1.5		1.5	V
				3.0		4.5	3.0		3.0	V
				4.0		6.75	4.0		4.0	V
V _{IH}	High Level Input Voltage	I _O < 1 μA V _{DD} = 5V, V _O = 0.5V or 4.5V V _{DD} = 10V, V _O = 1V or 9V V _{DD} = 15V, V _O = 1.5V or 13.5V	3.5		3.5	2.75		3.5		V
			7.0		7.0	5.5		7.0		V
			11.0		11.0	8.25		11.0		V
I _{OL}	Low Level Output Current (Note 3)	V _{IH} = V _{DD} , V _{IL} = 0V V _{DD} = 5V, V _O = 0.4V V _{DD} = 10V, V _O = 0.5V V _{DD} = 15V, V _O = 1.5V	0.52		0.44	0.88		0.36		mA
			1.3		1.1	2.25		0.9		mA
			3.6		3.0	8.8		2.4		mA
I _{OH}	High Level Output Current (Note 3)	V _{IH} = V _{DD} , V _{IL} = 0V V _{DD} = 5V, V _O = 4.6V V _{DD} = 10V, V _O = 9.5V V _{DD} = 15V, V _O = 13.5V	-0.52		-0.44	-0.88		-0.36		mA
			-1.3		-1.1	-2.25		-0.9		mA
			-3.6		-3.0	-8.8		-2.4		mA
I _{IN}	Input Current	V _{DD} = 15V, V _{IN} = 0V V _{DD} = 15V, V _{IN} = 15V		-0.3		-10 ⁻⁵	-0.3		-1.0	μA
				0.3		10 ⁻⁵	0.3		1.0	μA

AC Electrical Characteristics T_A = 25°C, C_L = 50 pF, R_L = 200 kΩ, t_r = t_f = 20 ns, unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
t _{PHL} , t _{PLH}	Propagation Delay Time, Clock → Q	V _{DD} = 5V		325	650	ns
		V _{DD} = 10V		110	225	ns
		V _{DD} = 15V		85	170	ns
t _{PHL}	Propagation Delay Time Reset → Q	V _{DD} = 5V		220	560	ns
		V _{DD} = 10V		90	230	ns
		V _{DD} = 15V		65	160	ns
t _{THL} , t _{TLH}	Transition Time	V _{DD} = 5V		100	200	ns
		V _{DD} = 10V		50	100	ns
		V _{DD} = 15V		40	80	ns
f _{CL}	Maximum Clock Input Frequency	V _{DD} = 5V	1.5	3		MHz
		V _{DD} = 10V	3.0	6		MHz
		V _{DD} = 15V	4.0	8		MHz
t _{WL} , t _{WH}	Minimum Clock Pulse Width	V _{DD} = 5V		100	200	ns
		V _{DD} = 10V		50	100	ns
		V _{DD} = 15V		35	70	ns
t _{RCL} , t _{FC}	Maximum Clock or Enable Rise and Fall Time	V _{DD} = 5V	15			μs
		V _{DD} = 10V	10			μs
		V _{DD} = 15V	5			μs
t _{WH} , t _{WL}	Minimum Enable Pulse Width	V _{DD} = 5V		125	250	ns
		V _{DD} = 10V		55	110	ns
		V _{DD} = 15V		40	80	ns
t _{WH}	Minimum Reset Pulse Width	V _{DD} = 5V		180	375	ns
		V _{DD} = 10V		80	160	ns
		V _{DD} = 15V		65	130	ns
C _{IN}	Input Capacitance	Any Input		5	7.5	pF
C _{PD}	Power Dissipation Capacity	Either Counter, (Note 4)		50		pF

Note 1: "Absolute Maximum Ratings" are those values beyond which the safety of the device cannot be guaranteed. They are not meant to imply that the devices should be operated at these limits. The tables of "Recommended Operating Conditions" and "Electrical Characteristics" provide conditions for actual device operation.

Note 2: V_{SS} = 0V unless otherwise specified.

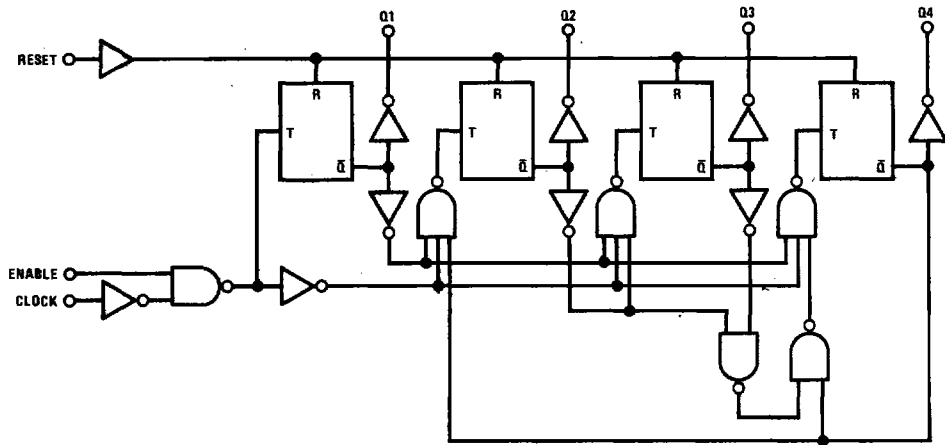
Note 3: I_{OH} and I_{OL} are tested one output at a time.

Note 4: C_{PD} determines the no load ac power consumption of a CMOS device. For a complete explanation, see "54C/74C Family Characteristics," application note AN-90.

Logic Diagrams

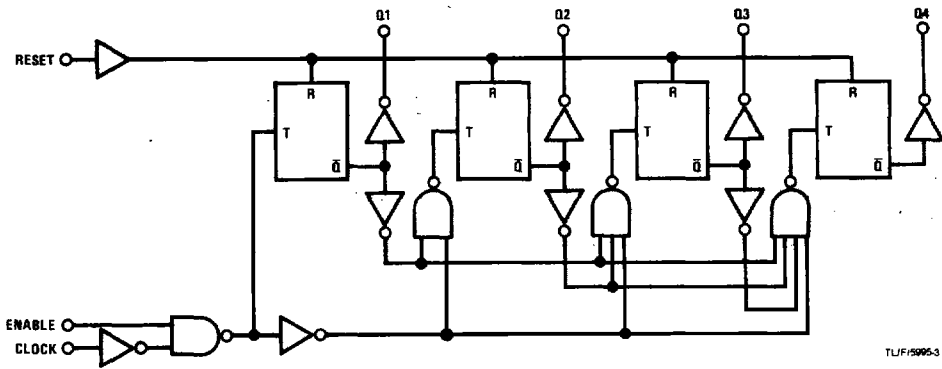
CD4518BM/CD4518BC, CD4520BM/CD4520BC

Decade Counter (CD4518B) 1/2 Device Shown



TUJ/5995-2

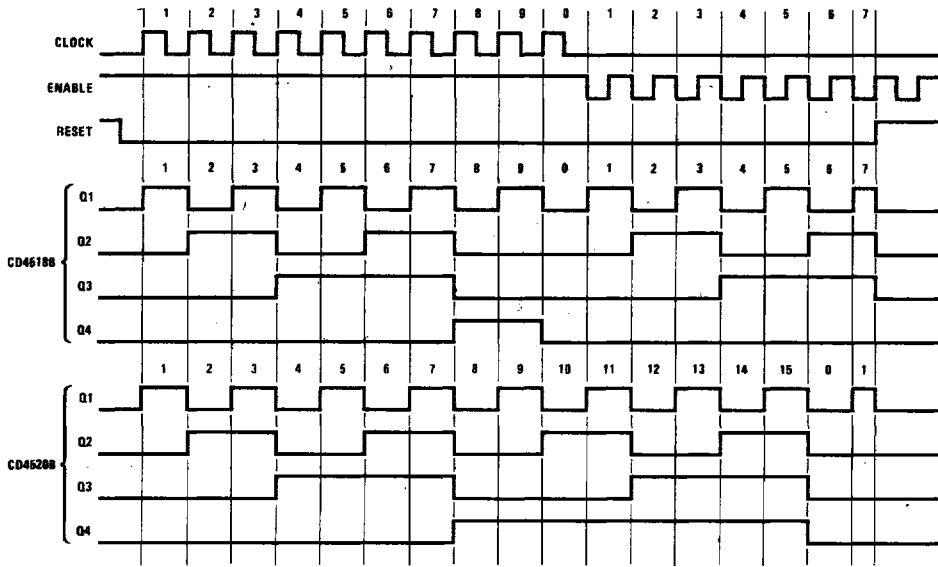
Binary Counter (CD4520B) 1/2 Device Shown



TUJ/5995-3

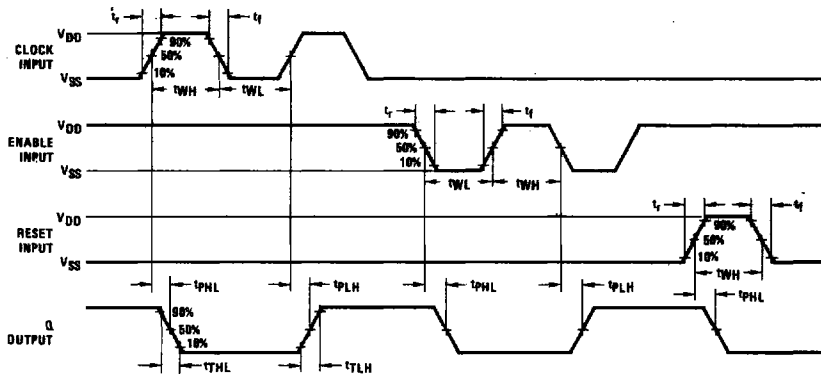


Timing Diagrams



TUF/8906-4

Switching Time Waveforms



TUF/8906-5