

CD4521 CMOS 24-Stage Frequency Divider

1. General Description

1.1 Description

CD4521 consists of an oscillator section and 24 ripple-carry binary counter stages. The oscillator configuration (using IN1) allows design of either RC or crystal oscillator circuits. IN1 should be tied either HIGH or LOW when not in use. A HIGH on the RESET causes the counter to go to the all-0's state and disables the oscillator. The count is advanced on the negative transition of IN1 (and IN2).

1.2 Features

- Reset disables the RC oscillator for low-power standby condition
- VDD' and VSS' pins are brought out from the

crystal oscillator to allow use of external
resistors for low-power operation

- Common reset
- Standardized, symmetrical output characteristics
- 100% tested for quiescent current at 18 V
- Maximum input current of 1μA at 18V and 25°C
- 5V, 10V, and 15V parametric ratings

1.3 Device Information

PART NUMBER	PACKAGE
CD4521	DIP
	SOP
	TSSOP

2. Pin Description and Functional Diagram

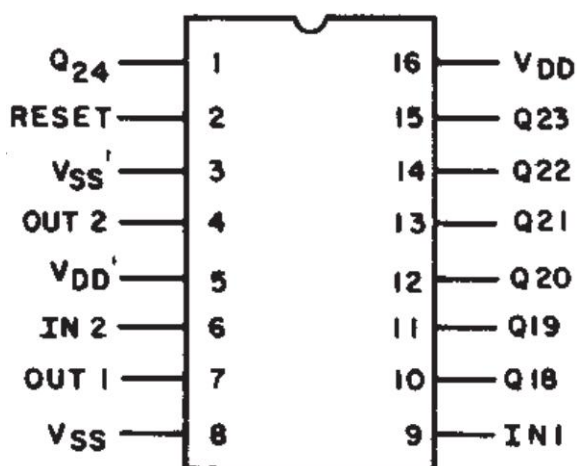


Figure 2.1 Top View

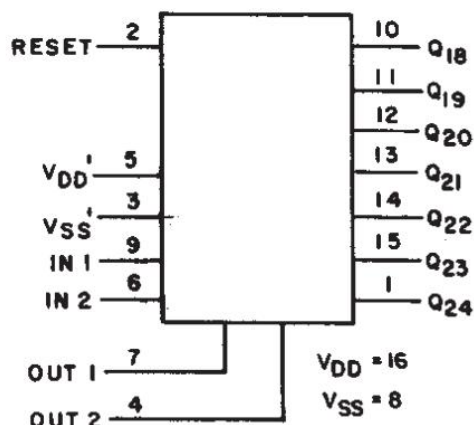


Figure 2.2 Functional Diagram



PIN No.	NAME	I/O	FUNCTION
1	Q24	I	Data Output
2	RESET	I	RESET Input
3	VSS'		Ground'
4	OUT2	O	External oscillator connection
5	VDD'		Supply Voltage'
6	IN2	I	External oscillator connection
7	OUT1	O	External oscillator connection
8	VSS		Ground
9	IN1	I	External oscillator connection
10	Q18	O	Data Output
11	Q19	O	Data Output
12	Q20	O	Data Output
13	Q21	O	Data Output
14	Q22	O	Data Output
15	Q23	O	Data Output
16	VDD		Supply Voltage

OUTPUT	COUNT CAPACITY
Q18	$2^{18} = 262,144$
Q19	$2^{19} = 524,288$
Q20	$2^{20} = 1,048,576$
Q21	$2^{21} = 2,097,152$
Q22	$2^{22} = 4,194,304$
Q23	$2^{23} = 8,388,608$
Q24	$2^{24} = 16,777,216$

3. System Diagram

3.1 Logic Diagram

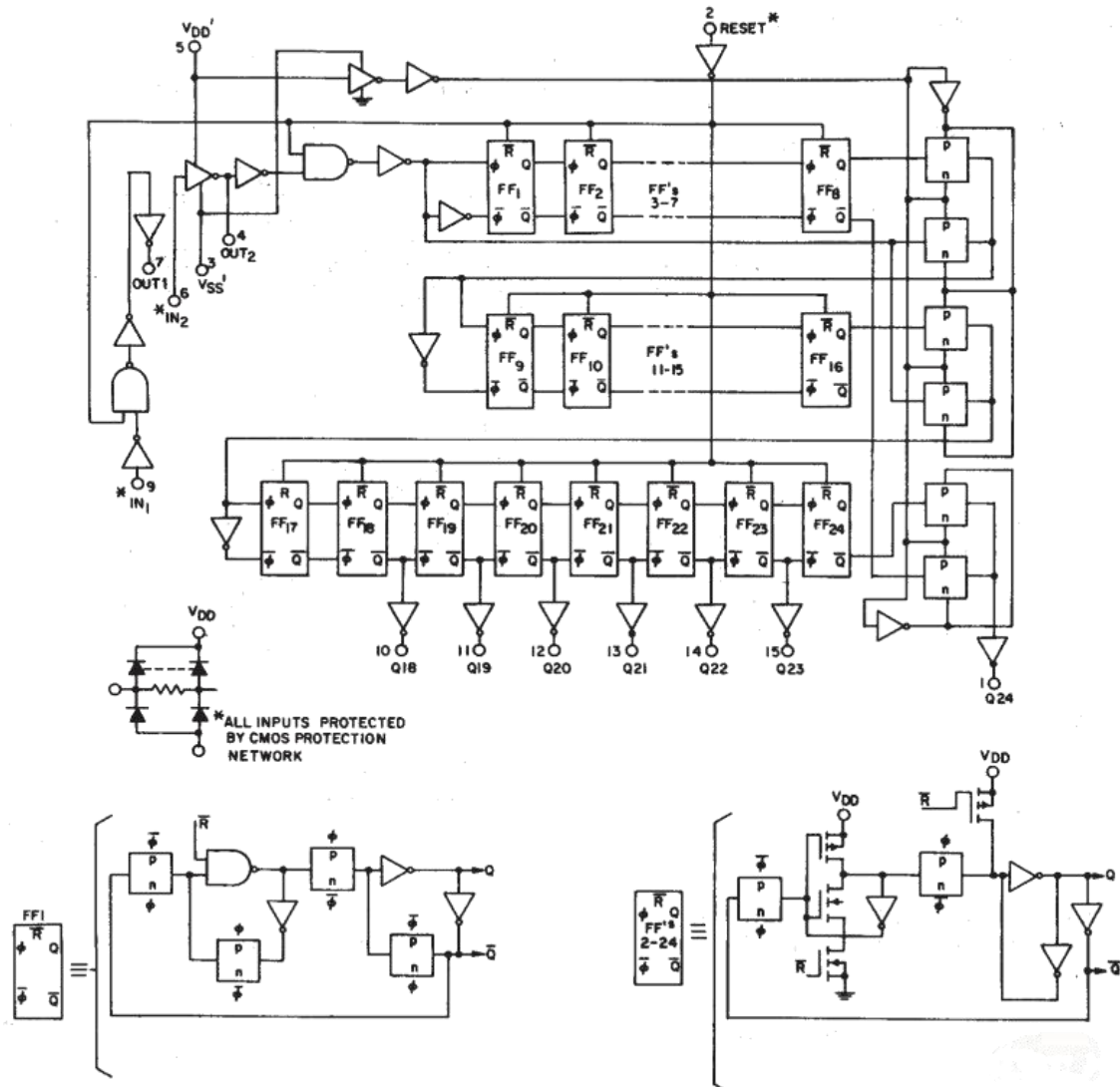


Figure 3.1: CD4521 Logic Diagram

4. Specifications

4.1 Absolute Maximum Ratings

Symbol	Parameter	MIN	MAX	Unit
V_{DD}	DC Supply Voltage Range (Voltage Referenced to VSS Terminals)	-0.5	20	V
V_i	Input Voltage Range, All Inputs	0.5	$V_{DD}+0.5$	V
P_D	Power Dissipation		500	mW
T_J	Junction Temperature		125	°C
T_{OP}	Operating Temperature	-40	85	°C

Absolute maximum ratings are those values beyond which the device could be permanently damaged. These are stress ratings only, which do not imply functional operation of the device at these or any other conditions beyond those indicated under Recommended Operating Conditions.



4.2 Electrical Characteristics

4.2.1 DC Specifications

(T_a=25°C, voltages are referenced to VSS (ground=0V), unless otherwise specified)

Symbol	Parameter	Test Condition			MIN	TYP	MAX	Unit
		VO	VIN	VDD				
I _{DD}	Supply Current	--	0,5	5	--	0	1	uA
		--	0,10	10	--	0	1	uA
		--	0,18	18	--	0	1	uA
I _{OL}	Low Level Output Current (Pin4,7)	0.4	0,5	5	1	2	--	mA
		0.5	0,10	10	2.5	5	--	mA
		1.5	0,15	15	10	20	--	mA
	Low Level Output Current (Pin1,10,11,12,13,14,15)	0.4	0,5	5	1.5	3	--	mA
		0.5	0,10	10	3	7	--	mA
		1.5	0,15	15	12	25	--	mA
I _{OH}	Low Level Output Current (Pin4,7)	4.6	0,5	5	-0.2	-0.5	--	mA
		2.5	0,5	5	-1	-2	--	mA
		9.5	0,10	10	-0.5	-1	--	mA
		13.5	0,15	15	-2	-4	--	mA
	Low Level Output Current (Pin7)	4.6	0,5	5	-0.5	-1	--	mA
		2.5	0,5	5	-2	-5	--	mA
		9.5	0,10	10	-1	-2	--	mA
		13.5	0,15	15	-4	-9	--	mA
	High Level Output Current (Pin1,10,11,12,13,14,15)	4.6	0,5	5	-0.5	-1.5	--	mA
		2.5	0,5	5	-3	-7	--	mA
		9.5	0,10	10	-1.5	-3.5	--	mA
		13.5	0,15	15	-6	-13	--	mA
V _{OL}	Low Level Output Voltage	--	0,5	5	--	0	0.05	V
		--	0,10	10	--	0	0.05	V
		--	0,15	15	--	0	0.05	V
V _{OH}	High Level Output Voltage	--	0,5	5	4.95	5	--	V
		--	0,10	10	9.95	10	--	V
		--	0,15	15	14.95	15	--	V
V _{IL}	Low Level Input Voltage	0.5,4.5	--	5	--	--	1.5	V
		1,9	--	10	--	--	3	V
		1.5,13.5	--	15	--	--	4	V
V _{IH}	High Level Input Voltage	0.5,4.5	--	5	3.5	--	--	V
		1,9	--	10	7	--	--	V
		1.5,13.5	--	15	11	--	--	V
I _{IN}	Input Leakage Current	--	0,18	18	--	0	±1	uA



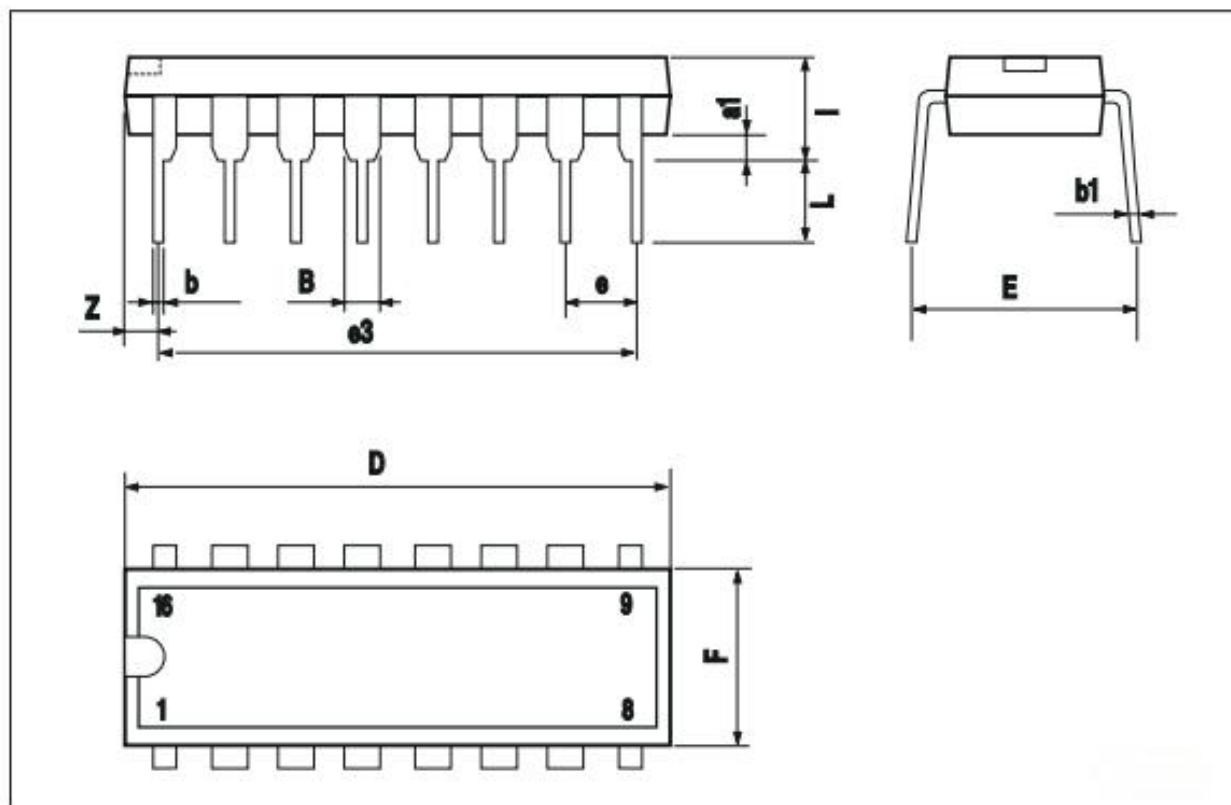
5. Ordering Information

Orderable Device	Package Type	Pins	Packing	Package Qty
CD4521ND16ATBE	DIP	16	Tube	25
CD4521NS16ARDQ	SOP	16	Tape & Reel	4000
CD4521TS16ARDQ	TSSOP	16	Tape & Reel	4000

6. Package Information

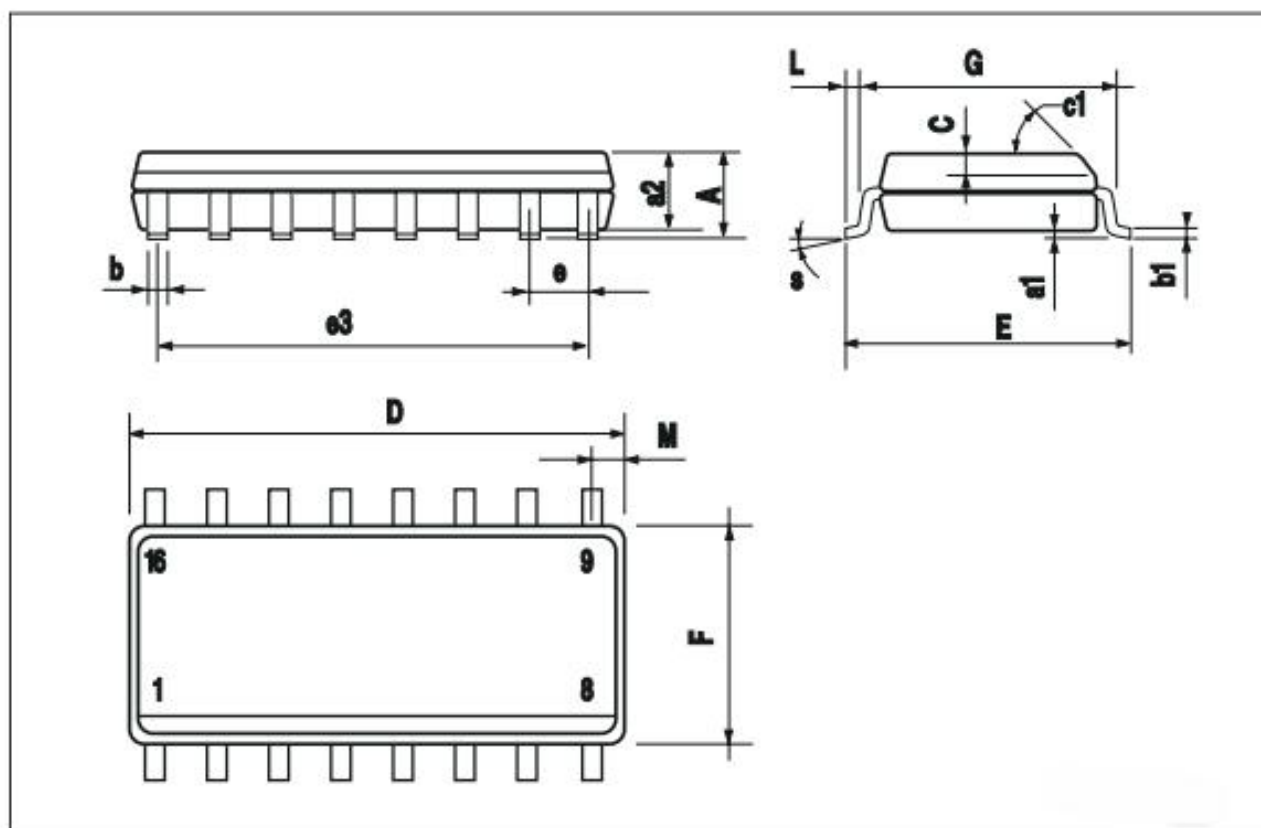
6.1 DIP16

Dim.	mm.			inch.		
	Min.	Typ.	Max.	Min.	Typ.	Max.
a1	0.51			0.020		
B	0.77		1.65	0.030		0.065
b		0.5			0.020	
b1		0.25			0.010	
D			20			0.787
E		8.5			0.335	
e		2.54			0.100	
e3		17.78			0.700	
F			7.1			0.280
I			5.1			0.201
L		3.3			0.130	
Z			1.27			0.050



6.2 SOP16

Dim.	mm.			inch.		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			1.75			0.068
a1	0.1		0.25	0.004		0.010
a2			1.64			0.063
b	0.35		0.46	0.013		0.018
b1	0.19		0.25	0.007		0.010
C		0.5			0.019	
c1	45° (typ.)					
D	9.8		10	0.385		0.393
E	5.8		6.2	0.228		0.244
e		1.27			0.050	
e3		8.89			0.350	
F	3.8		4.0	0.149		0.157
G	4.6		5.3	0.181		0.208
L	0.5		1.27	0.019		0.050
M			0.62			0.024
S	8° (max.)					



6.3 TSSOP16

Dim.	mm.			inch.		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			1.2			0.047
A1	0.05		0.15	0.002	0.004	0.006
A2	0.8	1	1.05	0.031	0.039	0.041
b	0.19		0.30	0.007		0.012
c	0.09		0.20	0.004		0.0079
D	4.9	5	5.1	0.193	0.197	0.201
E	6.2	6.4	6.6	0.244	0.252	0.260
E1	4.3	4.4	4.48	0.169	0.173	0.176
e		0.65 BSC			0.0256 BSC	
K	0°		8°	0°		8°
L	0.45	0.60	0.75	0.018	0.024	0.030

