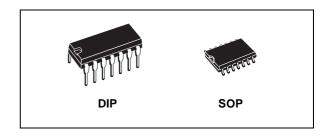


# 18-STAGE STATIC SHIFT REGISTER

- PERMANENT REGISTER STORAGE WITH CLOCK LINE "HIGH" OR "LOW" ... NO INFORMATION RECIRCULATION REQUIRED
- FULLY STATIC OPERATION
- SHIFTING RATES UP TO 12MHzat 10V (Typ.)
- STANDARDIZED SYMMETRICAL OUTPUT CHARACTERISTICS
- QUIESCENT CURRENT SPECIFIED UP TO 20V
- 5V, 10V AND 15V PARAMETRIC RATINGS
- INPUT LEAKAGE CURRENT I<sub>I</sub> = 100nA (MAX) AT V<sub>DD</sub> = 18V T<sub>A</sub> = 25°C
- 100% TESTED FOR QUIESCENT CURRENT
- MEETS ALL REQUIREMENTS OF JEDEC JESD13B " STANDARD SPECIFICATIONS FOR DESCRIPTION OF B SERIES CMOS DEVICES"



The HCF4006B is a monolithic integrated circuit fabricated in Metal Oxide Semiconductor technology available in DIP and SOP packages. The HCF4006B is comprised of 4 separate "shift register" sections; two sections of four stages and two sections of five stages with an output tap at the fourth stage. Each section has an independent "single rail" data path. A common clock signal is

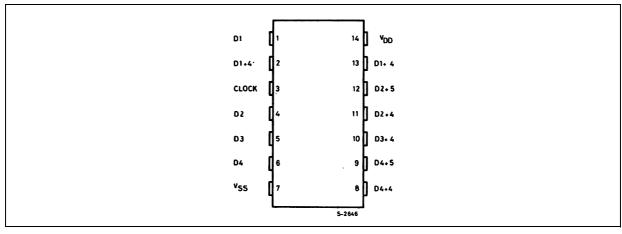


#### **ORDER CODES**

PACKAGE	TUBE	T&R				
DIP	HCF4006BEY					
SOP	HCF4006BM1	HCF4006M013TR				

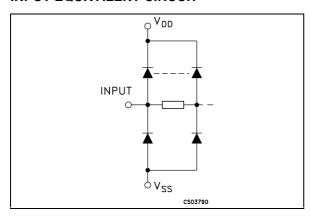
used for all stages. Data is shifted to the next stage on negative going transitions of the clock. Through appropriate connections of inputs and outputs, multiple register sections of 4, 5, 8 and 9 stages or single register sections of 10, 12, 13, 14, 16, 17 and 18 can be implemented using one HCF4006B package. Longer shift register sections can be assembled by using more than one HCF4006B. To facilitate cascading stages when clock rise and fall times are slow, an optional output (D1+4') that is delayed one-half clock-cycle, is provided (see truth table for output from pin 2)

#### **PIN CONNECTION**



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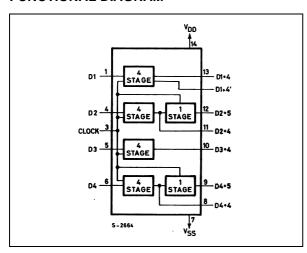
#### **INPUT EQUIVALENT CIRCUIT**



#### **PIN DESCRIPTION**

PIN No	SYMBOL	NAME AND FUNCTION			
1, 4, 5, 6	D1 to D4	Data inputs			
2	D1+4'	Delayed Optional Output			
13, 11, 10, 8	Dn + 4	4 stage shift register Output			
12, 9	Dn + 5	5 stage shift register Output			
3	CLOCK	Clock Input			
7	$V_{SS}$	Negative Supply Voltage			
14	$V_{DD}$	Positive Supply Voltage			

## **FUNCTIONAL DIAGRAM**



#### TRUTH TABLE FOR SHIFT REGISTER STAGE

D	CLOCK*	D + 1
L	Z	L
Н	l l	Н
X		NO CHANGE

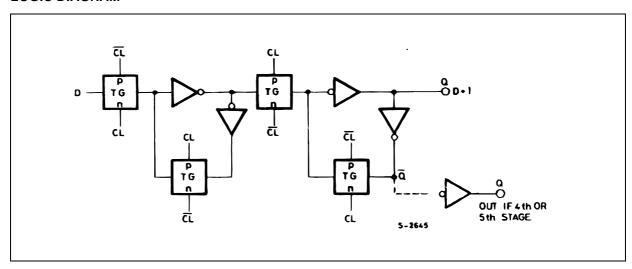
#### TRUTH TABLE FOR OUTPUT FROM PIN 2

D1 + 4	CLOCK*	D1 + 4'
L		L
Н		Н
Х		NO CHANGE

\*: Level Change

X : Don't Care

#### **LOGIC DIAGRAM**



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## **ABSOLUTE MAXIMUM RATINGS**

Symbol	Parameter	Value	Unit
V <sub>DD</sub>	Supply Voltage	-0.5 to +22	V
V <sub>I</sub>	DC Input Voltage	-0.5 to V <sub>DD</sub> + 0.5	V
I <sub>I</sub>	DC Input Current	± 10	mA
P <sub>D</sub>	Power Dissipation per Package	200	mW
	Power Dissipation per Output Transistor	100	mW
T <sub>op</sub>	Operating Temperature	-55 to +125	°C
T <sub>stg</sub>	Storage Temperature	-65 to +150	°C

Absolute Maximum Ratings are those values beyond which damage to the device may occur. Functional operation under these conditions is not implied.

All voltage values are referred to V<sub>SS</sub> pin voltage.

## **RECOMMENDED OPERATING CONDITIONS**

Symbol	Parameter	Value	Unit
$V_{DD}$	Supply Voltage	3 to 20	V
V <sub>I</sub>	Input Voltage	0 to V <sub>DD</sub>	V
T <sub>op</sub>	Operating Temperature	-55 to 125	°C

## **DC SPECIFICATIONS**

			Test Con	dition		Value							
Symbol	Symbol Parameter		v <sub>o</sub>	I <sub>O</sub>	V <sub>DD</sub>	Т	$T_A = 25^{\circ}C$			85°C	-55 to 125°C		Unit
		(V) (V) (μA) (V) Min.	Min.	Тур.	Max.	Min.	Max.	Min.	Max.				
IL	Quiescent Current	0/5			5		0.04	5		150		150	
		0/10			10		0.04	10		300		300	^
		0/15			15		0.04	20		600		600	μΑ
		0/20			20		0.08	100		3000		3000	
V <sub>OH</sub>	High Level Output	0/5		<1	5	4.95			4.95		4.95		
	Voltage	0/10		<1	10	9.95			9.95		9.95		V
		0/15		<1	15	14.95			14.95		14.95		
$V_{OL}$	Low Level Output	5/0		<1	5		0.05			0.05		0.05	
	Voltage	10/0		<1	10		0.05			0.05		0.05	V
		15/0		<1	15		0.05			0.05		0.05	
$V_{IH}$	High Level Input		0.5/4.5	<1	5	3.5			3.5		3.5		V
	Voltage		1/9	<1	10	7			7		7		
			1.5/13.5	<1	15	11			11		11		
$V_{IL}$	Low Level Input		4.5/0.5	<1	5			1.5		1.5		1.5	
	Voltage		9/1	<1	10			3		3		3	V
			13.5/1.5	<1	15			4		4		4	
I <sub>OH</sub>	Output Drive	0/5	2.5	<1	5	-1.36	-3.2		-1.1		-1.1		
	Current	0/5	4.6	<1	5	-0.44	-1		-0.36		-0.36		mΑ
		0/10	9.5	<1	10	-1.1	-2.6		-0.9		-0.9		IIIA
		0/15	13.5	<1	15	-3.0	-6.8		-2.4		-2.4		
$I_{OL}$	Output Sink	0/5	0.4	<1	5	0.44	1		0.36		0.36		
	Current	0/10	0.5	<1	10	1.1	2.6		0.9		0.9		mΑ
		0/15	1.5	<1	15	3.0	6.8		2.4		2.4		
I <sub>I</sub>	Input Leakage Current	0/18	Any In	put	18		±10 <sup>-5</sup>	±0.1		±1		±1	μΑ
Cl	Input Capacitance		Any In	put			5	7.5					pF

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

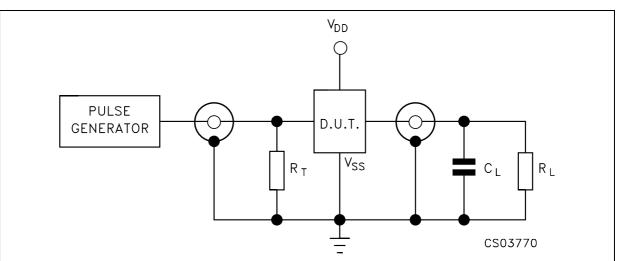
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 $\textbf{DYNAMIC ELECTRICAL CHARACTERISTICS} \; (\textbf{T}_{amb} = 25 ^{\circ} \text{C}, \;\; \textbf{C}_{L} = 50 \text{pF}, \; \textbf{R}_{L} = 200 \text{K}\Omega, \;\; \textbf{t}_{f} = \textbf{t}_{f} = 20 \; \text{ns})$ 

		7	Test Condition	,	Unit		
Symbol	Parameter	V <sub>DD</sub> (V)		Min.	Тур.	Max.	
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay Time	5			200		
		10			100		ns
		15			80		
t <sub>TLH</sub> t <sub>THL</sub>	Output Transition Time	5			100		
		10			50		ns
		15			40		
t <sub>W</sub>	W Clock Pulse Width	5			100		
		10			45		ns
		15			30		
t <sub>r,</sub> t <sub>f</sub>	Clock Input Rise or Fall	5			15		
	Time*	10			15		μs
		15			15		
t <sub>setup</sub>	Data Setup Time	5			50		
•		10			25		ns
		15			20		
f <sub>MAX</sub>	Maximum Clock Input	5			5		
	Frequency	10			12		MHz
		15			16		

<sup>(\*)</sup> Typical temperature coefficient for all  $\rm V_{DD}$  value is 0.3 %/°C.

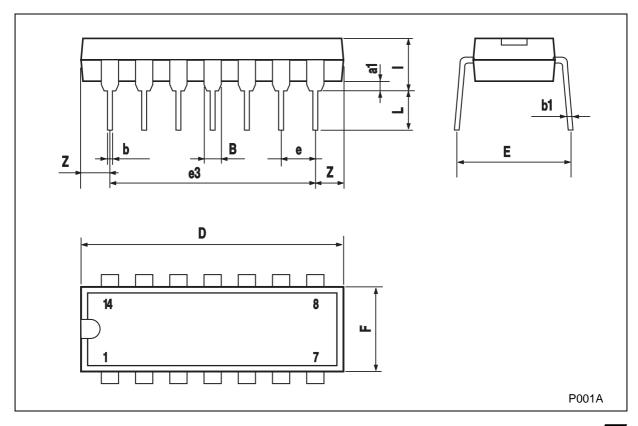
## **TEST CIRCUIT**



 $C_L$  = 50pF or equivalent (includes jig and probe capacitance)  $R_L$  = 200K $\Omega$   $R_T$  =  $Z_{OUT}$  of pulse generator (typically 50 $\Omega$ )

# Plastic DIP-14 MECHANICAL DATA

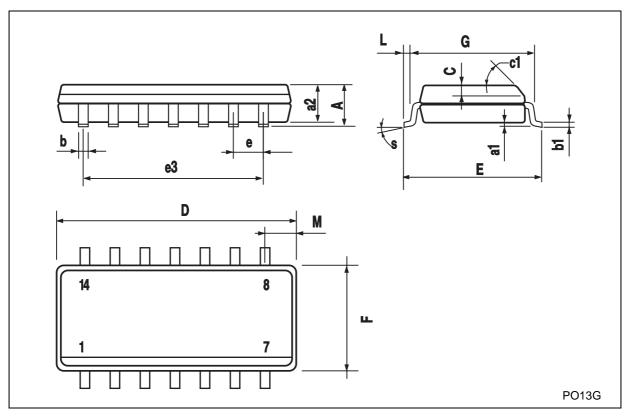
DIM.		mm.				
DIWI.	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
a1	0.51			0.020		
В	1.39		1.65	0.055		0.065
b		0.5			0.020	
b1		0.25			0.010	
D			20			0.787
E		8.5			0.335	
е		2.54			0.100	
e3		15.24			0.600	
F			7.1			0.280
I			5.1			0.201
L		3.3			0.130	
Z	1.27		2.54	0.050		0.100



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# **SO-14 MECHANICAL DATA**

DIM		mm.		inch				
DIM.	MIN.	TYP	MAX.	MIN.	TYP.	MAX.		
Α			1.75			0.068		
a1	0.1		0.2	0.003		0.007		
a2			1.65			0.064		
b	0.35		0.46	0.013		0.018		
b1	0.19		0.25	0.007		0.010		
С		0.5			0.019			
c1			45°	(typ.)	•			
D	8.55		8.75	0.336		0.344		
Е	5.8		6.2	0.228		0.244		
е		1.27			0.050			
e3		7.62			0.300			
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		
М			0.68			0.026		
S			8° (	max.)	•	•		



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