TC4034BP

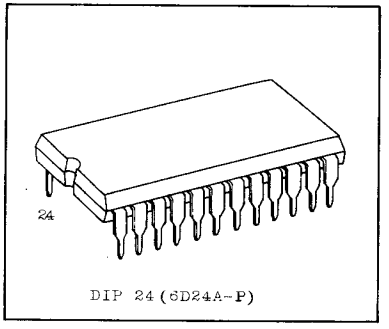
C²MOS DIGITAL INTEGRATED CIRCUIT
SILICON MONOLITHIC

TC4034BP 8-STAGE STATIC BIDIRECTIONAL PARALLEL/SERIAL INPUT/OUTPUT BUS REGISTER

TC4034BP is bidirectional 8 bit bus register having eight data input/output lines A_1 through A_8 and another set of eight data input/output lines B_1 through B_8. Switching of input/output for A data lines and B data lines is controlled by A/$\overline{B}$ input terminal and selection of serial operation/parallel operation is controlled by P/$\overline{S}$ input terminal.

(PARALLEL OPERATION)
When P/$\overline{S}$ input is placed at "H", synchronous or asynchronous parallel data can be input.

(SERIAL OPERATION)
When P/$\overline{S}$ input is placed at "L", serial data can be read synchronously.

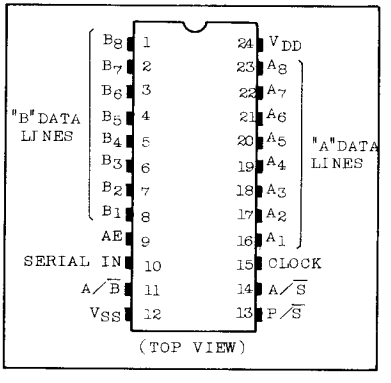


DIP 24 (6D24A-P)

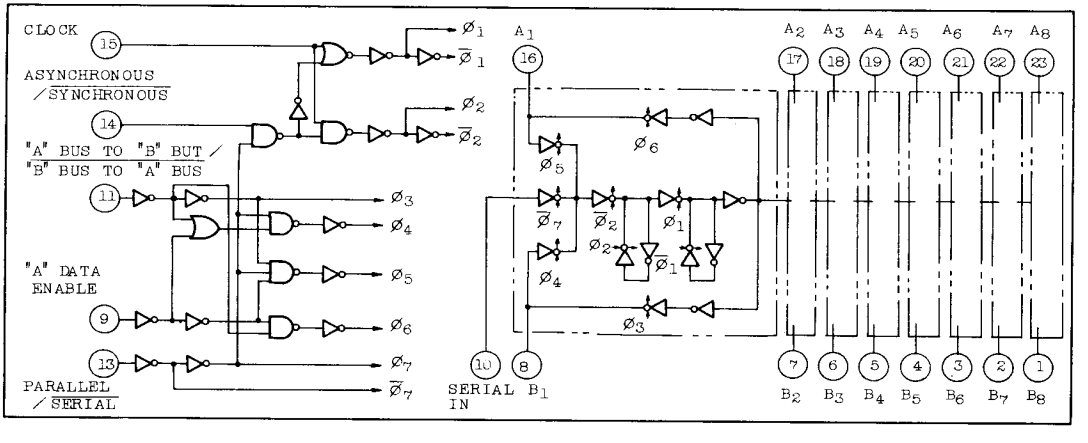
ABSOLUTE MAXIMUM RATINGS

CHARACTERISTIC	SYMBOL	RATING	UNIT
DC Supply Voltage	V_{DD}	V_{SS}-0.5 ~ V_{SS}+20	V
Input Voltage	V_{IN}	V_{SS}-0.5 ~ V_{DD}+0.5	V
Output Voltage	V_{OUT}	V_{SS}-0.5 ~ V_{DD}+0.5	V
DC Input Current	I_{IN}	±10	mA
Power Dissipation	P_D	300	mW
Operating Temperature Range	T_A	-40 ~ 85	°C
Storage Temperature Range	T_{stg}	-65 ~ 150	°C
Lead Temp./Time	T_{sol}	260°C · 10 sec	

PIN ASSIGNMENT



LOGIC DIAGRAM



TRUTH TABLE

AE	P/$\overline{S}$	A/$\overline{B}$	A/$\overline{S}$	MODE	OPERATION
L	L	L	*	Serial	Synchronous Serial data input, "A" Parallel data outputs disabled
L	L	H	*	Serial	Synchronous Serial data input, "B" Parallel data output
L	H	L	L	Parallel	"B" Synchronous Parallel data inputs, "A" Parallel data outputs disabled
L	H	L	H	Parallel	"B" Asynchronous Parallel data inputs, "A" Parallel data outputs disabled
L	H	H	L	Parallel	"A" Parallel data inputs disabled, "B" Parallel data outputs, Synchronous data recirculation
L	H	H	H	Parallel	"A" Parallel data inputs disabled, "B" Parallel data outputs, Asynchronous data recirculation
H	L	L	*	Serial	Synchronous Serial data input, "A" Parallel data outputs
H	L	H	*	Serial	Synchronous Serial data input, "B" Parallel data outputs
H	H	L	L	Parallel	"B" Synchronous Parallel data inputs, "A" Parallel data outputs
H	H	L	H	Parallel	"B" Asynchronous Parallel data inputs, "A" Parallel data outputs
H	H	H	L	Parallel	"A" Synchronous Parallel data inputs, "B" Parallel data outputs
H	H	H	H	Parallel	"A" Asynchronous Parallel data inputs, "B" Parallel data outputs

* Don't care

RECOMMENDED OPERATING CONDITIONS (V_{SS}=0V)

CHARACTERISTIC	SYMBOL		MIN.	TYP.	MAX.	UNIT
DC Supply Voltage	V_{DD}		3	-	18	V
Input Voltage	V_{IN}		0	-	V_{DD}	V

STATIC ELECTRICAL CHARACTERISTICS (V_{SS}=0V)

CHARACTERISTIC		SYMBOL	TEST CONDITION	V_{CC} (V)	-40°C MIN.	-40°C MAX.	25°C MIN.	25°C TYP.	25°C MAX.	85°C MIN.	85°C MAX.	UNIT
High-Level Output Voltage		V_{OH}	$\|I_{OUT}\|<1\mu A$ $V_{IN}=V_{SS},V_{DD}$	5	4.95	-	4.95	5.00	-	4.95	-	V
				10	9.95	-	9.95	10.00	-	9.95	-	
				15	14.95	-	14.95	15.00	-	14.95	-	
Low-Level Output Voltage		V_{OL}	$\|I_{OUT}\|<1\mu A$ $V_{IN}=V_{SS},V_{DD}$	5	-	0.05	-	0.00	0.05	-	0.05	
				10	-	0.05	-	0.00	0.05	-	0.05	
				15	-	0.05	-	0.00	0.05	-	0.05	
Output High Current		I_{OH}	V_{OH}=4.6V	5	-0.61	-	-0.51	-1.0	-	-0.42	-	mA
			V_{OH}=2.5V	5	-2.5	-	-2.1	-4.0	-	-1.7	-	
			V_{OH}=9.5V	10	-1.5	-	-1.3	-2.2	-	-1.1	-	
			V_{OH}=13.5V	15	-4.0	-	-3.4	-9.0	-	-2.8	-	
			$V_{IN}=V_{SS},V_{DD}$									
Output Low Current		I_{OL}	V_{OL}=0.4V	5	0.61	-	0.51	1.5	-	0.42	-	
			V_{OL}=0.5V	10	1.5	-	1.3	3.8	-	1.1	-	
			V_{OL}=1.5V	15	4.0	-	3.4	15.0	-	2.8	-	
			$V_{IN}=V_{SS},V_{DD}$									
Input High Voltage		V_{IH}	V_{OUT}=0.5V, 4.5V	5	3.5	-	3.5	2.75	-	3.5	-	V
			V_{OUT}=1.0V, 9.0V	10	7.0	-	7.0	5.5	-	7.0	-	
			V_{OUT}=1.5V,13.5V	15	11.0	-	11.0	8.25	-	11.0	-	
			$\|I_{OUT}\|<1\mu A$									
Input Low Voltage		V_{IL}	V_{OUT}=0.5V, 4.5V	5	-	1.5	-	2.25	1.5	-	1.5	
			V_{OUT}=1.0V, 9.0V	10	-	3.0	-	4.5	3.0	-	3.0	
			V_{OUT}=1.5V,13.5V	15	-	4.0	-	6.75	4.0	-	4.0	
			$\|I_{OUT}\|<1\mu A$									
Input Current	"H" Level	I_{IH}	V_{IH}=18V	18	-	0.1	-	10^{-5}	0.1	-	1.0	μA
	"L" Level	I_{IL}	V_{IL}=0V	18	-	-0.1	-	-10^{-5}	-0.1	-	-1.0	
3-State Output Leakage Current	"H" Level	I_{DH}	V_{OUT}=18V	18	-	0.4	-	10^{-5}	0.4	-	12	μA
	"L" Level	I_{DL}	V_{OUT}=0V	18	-	-0.4	-	-10^{-4}	-0.4	-	-12	
Quiescent Device Current		I_{DD}	$V_{IN}=V_{SS},V_{DD}$ *	5	-	5	-	0.010	5	-	150	μA
				10	-	10	-	0.020	10	-	300	
				15	-	20	-	0.030	20	-	600	

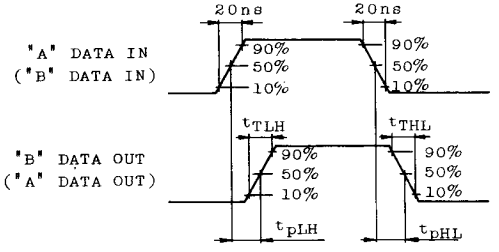
* All valid input combinations.

DYNAMIC ELECTRICAL CHARACTERISTICS (Ta=25°C, V_{SS}=0V, C_L=50pF)

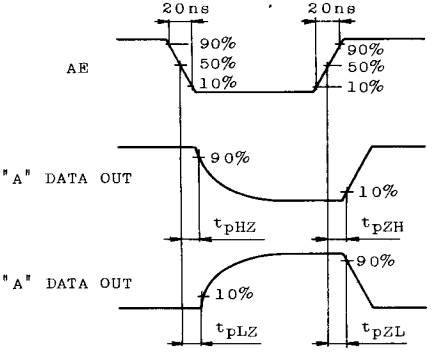
CHARACTERISTIC	SYMBOL	TEST CONDITION	V_{DD} (V)	MIN.	TYP.	MAX.	UNIT
Output Transition Time (Low to High)	t_{TLH}		5	-	80	200	ns
			10	-	50	100	
			15	-	40	80	
Output Transition Time (High to Low)	t_{THL}		5	-	80	200	
			10	-	50	100	
			15	-	40	80	
Propagation Delay Time ($A(B)_{IN}$ - $B(A)_{OUT}$)	t_{pLH} t_{pHL}		5	-	260	700	ns
			10	-	100	240	
			15	-	65	170	
Propagation Delay Time ($\overline{AE}$ - A_{OUT})	t_{pLZ} t_{pZL} t_{pHZ} t_{pZH}	R_L=1kΩ	5	-	130	400	ns
			10	-	55	160	
			15	-	30	120	
Max. Clock Frequency	f_{CL}		5	1.4	2.9	-	MHz
			10	3.5	7.1	-	
			15	5.1	10.2	-	
Max. Clock Input Rise Time Max. Clock Input Fall Time	t_{rCL} t_{fCL}		5	20	-	-	μs
			10	2.5	-	-	
			15	1.0	-	-	
Min. Clcok Pulse Width	t_W		5	-	175	350	ns
			10	-	70	140	
			15	-	50	100	
Min. Pulse Width ($\overline{AE}$, P/$\overline{S}$, A/$\overline{S}$)	t_{WH}		5	-	145	290	ns
			10	-	55	110	
			15	-	40	80	
Min. Set-up Time (SERIAL IN - CLOCK)	t_{SU}		5	-	80	160	ns
			10	-	30	60	
			15	-	20	40	
Min. Set-up Time ($A(B)_{IN}$ - CLOCK)	t_{SU}		5	-	60	150	ns
			10	-	20	50	
			15	-	10	25	
Input Capacitance	C_{IN}			-	5	7.5	pF

WAVEFORMS FOR MEASUREMENT OF DYNAMIC CHARACTERISTICS

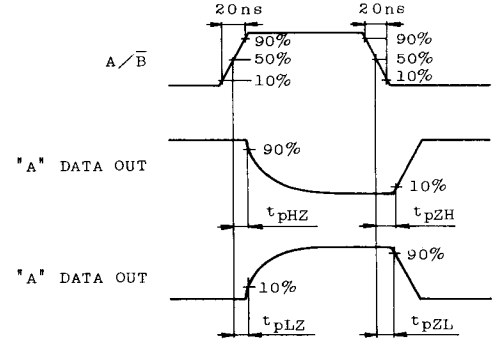
WAVEFORM 1.



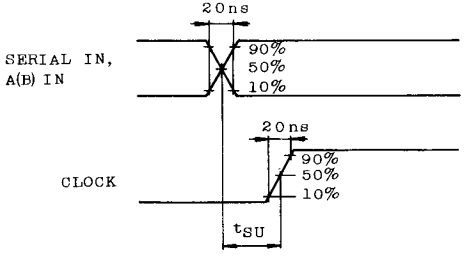
WAVEFORM 2.



WAVEFORM 3. (AE="H")



WAVEFORM 4.



WAVEFORM 5.