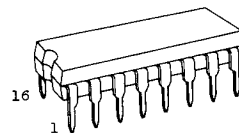


TC4008BP

C²MOS DIGITAL INTEGRATED CIRCUIT
SILICON MONOLITHIC

TC4008BP 4-BIT FULL ADDER

TC4008BP is full adder of 4 bit parallel processing type equipped with high speed parallel carry circuit. The sum of binary inputs applied to four augend data input lines (A₁-A₄), four addend data input lines (B₁-B₄) and carry input (C_{IN}) from the lower order is obtained in binary code from added data output (S₁-S₄) and carry output (C_{OUT}) to the higher order. Adders of 4 × n bits with cascade connections and add/subtract circuits with simple external circuits can be easily obtained.

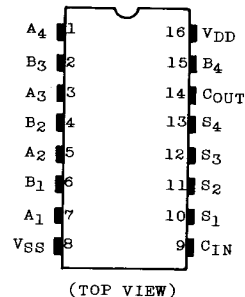


DIP 16(3D16A-P)

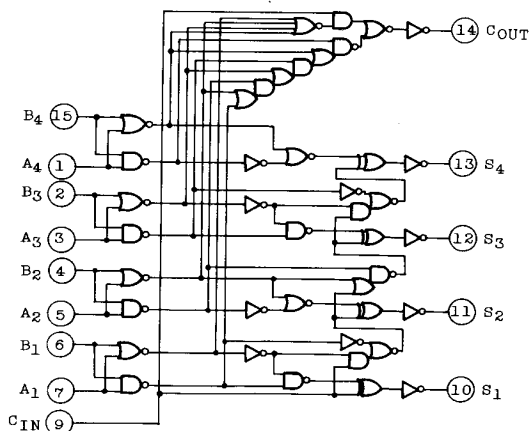
MAXIMUM RATINGS

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 Ambient Temperature Range	T _A	-40 ~ 85	°C
Storage Temperature Range	T _{stg}	-65 ~ 150	°C
Lead Temp./Time	T _{sol}	260°C . 10sec	

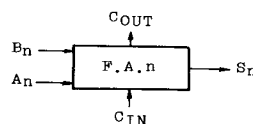
PIN ASSIGNMENT



LOGIC DIAGRAM



TRUTH TABLE



INPUTS			OUTPUTS	
B _n	A _n	C _{IN}	S _n	C _{OUT}
L	L	L	L	L
L	L	H	H	L
L	H	L	H	L
L	H	H	L	H
H	L	L	H	L
H	L	H	L	H
H	H	L	L	H
H	H	H	H	H

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

CHARACTERISTIC	SYMBOL	TEST CONDITION	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		SYM-BOL	TEST CONDITION	VDD (V)	-40°C		25°C			85°C		UNIT
					MIN.	MAX.	MIN.	TYP.	MAX.	MIN.	MAX.	
High-Level Output Voltage		VOH	IOUT < 1μA VIN=VSS,VDD	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		VOL	IOUT < 1μA VIN=VSS,VDD	5	-	0.05	-	0.00	0.05	-	0.05	V
				10	-	0.05	-	0.00	0.05	-	0.05	
				15	-	0.05	-	0.00	0.05	-	0.05	
Output High Current		IOH	VOH=4.6V	5	-0.61	-	-0.51	-1.0	-	-0.42	-	mA
			VOH=2.5V	5	-2.5	-	-2.1	-4.0	-	-1.7	-	
			VOH=9.5V	10	-1.5	-	-1.3	-2.2	-	-1.1	-	
			VOH=13.5V	15	-4.0	-	-3.4	-9.0	-	-2.8	-	
			VIN=VSS,VDD									
Output Low Current		IOL	VOL=0.4V	5	0.61	-	0.51	1.5	-	0.42	-	mA
			VOL=0.5V	10	1.5	-	1.3	3.8	-	1.1	-	
			VOL=1.5V	15	4.0	-	3.4	15.0	-	2.8	-	
			VIN=VSS,VDD									
Input High Voltage		VIH	VOUT=0.5V, 4.5V	5	3.5	-	3.5	2.75	-	3.5	-	V
			VOUT=1.0V, 9.0V	10	7.0	-	7.0	5.5	-	7.0	-	
			VOUT=1.5V, 13.5V	15	11.0	-	11.0	8.25	-	11.0	-	
			IOUT < 1μA									
Input Low Voltage		VIL	VOUT=0.5V, 4.5V	5	-	1.5	-	2.25	1.5	-	1.5	V
			VOUT=1.0V, 9.0V	10	-	3.0	-	4.5	3.0	-	3.0	
			VOUT=1.5V, 13.5V	15	-	4.0	-	6.75	4.0	-	4.0	
			IOUT < 1μA									
Input Current	"H" Level	IIH	VIH=18V	18	-	0.1	-	10 ⁻⁵	0.1	-	1.0	μA
	"L" Level	IIL	VIL=0V	18	-	-0.1	-	-10 ⁻⁵	-0.1	-	-1.0	
Quiescent Device Current		IDD	VIN=VSS,VDD *	5	-	5	-	0.005	5	-	150	μA
				10	-	10	-	0.010	10	-	300	
				15	-	20	-	0.015	20	-	600	

* All valid input combinations.

DYNAMIC ELECTRICAL CHARACTERISTICS ($T_a=25^\circ\text{C}$, $V_{SS}=0\text{V}$, $C_L=50\text{pF}$)

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 ($A_n, B_n - S_n$)	t_{pLH} t_{pHL}		5	-	300	800	ns
			10	-	120	320	
			15	-	80	230	
Propagation Delay Time ($A_n, B_n - \text{CARRY OUT}$)	t_{pLH} t_{pHL}		5	-	270	400	ns
			10	-	110	180	
			15	-	75	130	
Propagation Delay Time ($\text{CARRY IN} - S_n$)	t_{pLH} t_{pHL}		5	-	260	740	ns
			10	-	100	310	
			15	-	70	230	
Propagation Delay Time ($\text{CARRY IN} - \text{CARRY OUT}$)	t_{pLH} t_{pHL}		5	-	120	200	ns
			10	-	50	100	
			15	-	40	80	
Input Capacitance	C_{IN}			-	5	7.5	pF

WAVEFORM FOR MEASUREMENT OF DYNAMIC CHARACTERISTICS

