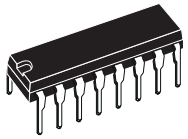
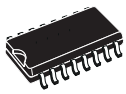
HCF4076B

4 BIT D TYPE REGISTERS

- THREE STATE OUTPUTS
- INPUT DISABLE WITHOUT GATING THE CLOCK
- GATED OUTPUT CONTROL LINES FOR ENABLING OR DISABLING THE OUTPUTS
- BUFFERED INPUTS AND OUTPUTS
- QUIESCENT CURRENT SPECIFIED UP TO 20V
- 5V, 10V AND 15V PARAMETRIC RATINGS
- INPUT LEAKAGE CURRENT I_I = 100nA (MAX) AT V_{DD} = 18V T_A = 25°C
- 100% TESTED FOR QUIESCENT CURRENT
- MEETS ALL REQUIREMENTS OF JEDEC JESD13B "STANDARD SPECIFICATIONS FOR DESCRIPTION OF B SERIES CMOS DEVICES"



DIP



SOP

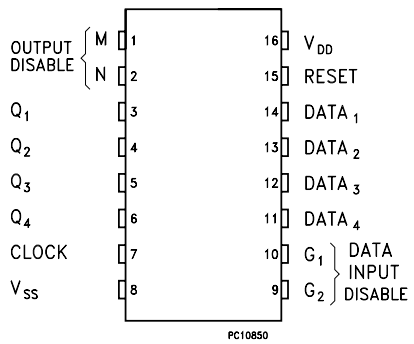
ORDER CODES

PACKAGE	TUBE	T & R
DIP	HCF4076BEY	
SOP	HCF4076BM1	HCF4076M013TR

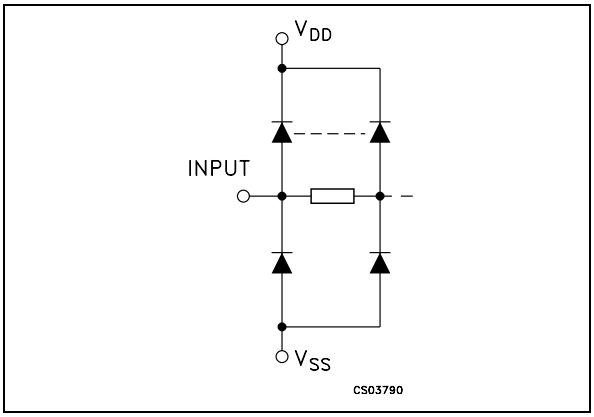
DESCRIPTION

HCF4076B is a monolithic integrated circuit fabricated in Metal Oxide Semiconductor technology available in DIP and SOP packages.
HCF4076B is a four bit register consisting of D-TYPE flip-flops that feature three state outputs. Data Disable inputs are provided to control the entry of data into the flip-flops. When both Data Disable inputs are low, data at the D inputs are loaded into their respective flip-flops on the next positive transition of the clock input. Output Disable inputs are also provided. When the Output Disable inputs are both low, the normal logic states of the four outputs are available to the load. The outputs are disabled independently of the clock by a high logic level at either Output Disable input, and present a high impedance.

PIN CONNECTION



IINPUT EQUIVALENT CIRCUIT



PIN DESCRIPTION

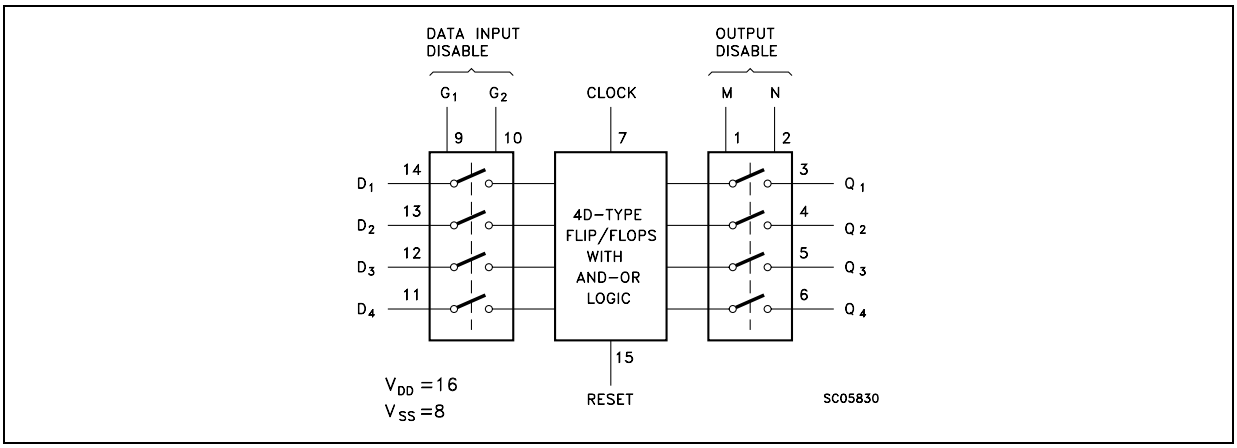
PIN No	SYMBOL	NAME AND FUNCTION
14, 13, 12, 11	DATA1 to DATA 4	D Inputs
10, 9	G1, G2	Data Input Disable Control
1, 2	M, N	Output Disable Control
7	CLOCK	Clock Input
15	RESET	Reset Input
8	V_{SS}	Negative Supply Voltage
16	V_{DD}	Positive Supply Voltage

TRUTH TABLE

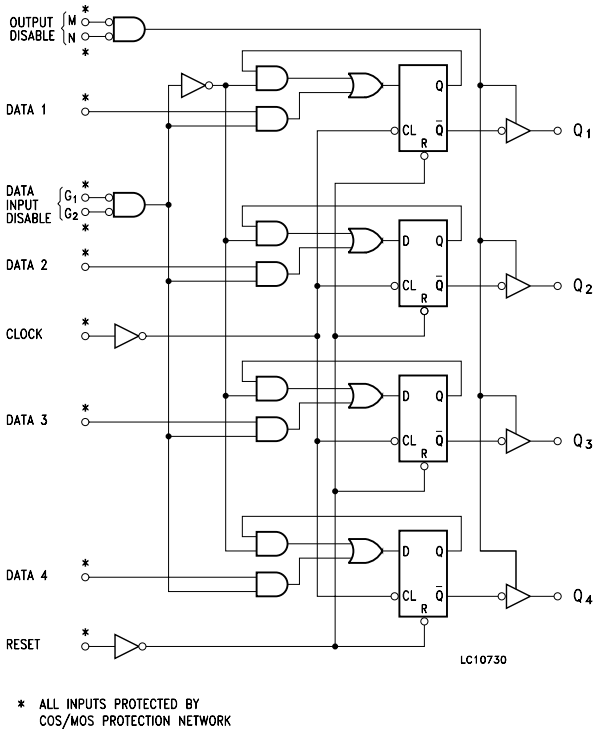
RESET	CLOCK	DATA INPUT DISABLE		DATA D	NEXT STATE OUTPUT	
		G1	G2			
H	X	X	X	X	L	
L	L	X	X	X	Q	NO CHANGE
L	⎍	H	X	X	Q	NO CHANGE
L	⎍	X	H	X	Q	NO CHANGE
L	⎍	L	L	H	H	
L	⎍	L	L	L	L	
L	H	X	X	X	Q	NO CHANGE
L	⎎	X	X	X	Q	NO CHANGE

X : Don't Care
When either Output Disable M or N is high, the outputs are disabled (high impedance state) : however sequential operation of the flip-flop is not affected.

FUNCTIONAL DIAGRAM



LOGIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{DD}	Supply Voltage	-0.5 to +22	V
V_I	DC Input Voltage	-0.5 to V_{DD} + 0.5	V
I_I	DC Input Current	± 10	mA
P_D	Power Dissipation per Package	200	mW
	Power Dissipation per Output Transistor	100	mW
T_{op}	Operating Temperature	-55 to +125	°C
T_{stg}	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_{SS} pin voltage.

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Value	Unit
V_{DD}	Supply Voltage	3 to 20	V
V_I	Input Voltage	0 to V_{DD}	V
T_{op}	Operating Temperature	-55 to 125	°C

DC SPECIFICATIONS

Symbol	Parameter	Test Condition				Value							Unit
		V_I (V)	V_O (V)	$\|I_O\|$ (μA)	V_{DD} (V)	T_A = 25°C			-40 to 85°C		-55 to 125°C		
						Min.	Typ.	Max.	Min.	Max.	Min.	Max.	
I_L	Quiescent Current	0/5			5		0.04	5		150		150	μA
		0/10			10		0.04	10		300		300	
		0/15			15		0.04	20		600		600	
		0/20			20		0.08	100		3000		3000	
V_{OH}	High Level Output Voltage	0/5		<1	5	4.95			4.95		4.95		V
		0/10		<1	10	9.95			9.95		9.95		
		0/15		<1	15	14.95			14.95		14.95		
V_{OL}	Low Level Output Voltage	5/0		<1	5		0.05			0.05		0.05	V
		10/0		<1	10		0.05			0.05		0.05	
		15/0		<1	15		0.05			0.05		0.05	
V_{IH}	High Level Input Voltage		0.5/4.5	<1	5	3.5			3.5		3.5		V
			1/9	<1	10	7			7		7		
			1.5/13.5	<1	15	11			11		11		
V_{IL}	Low Level Input Voltage		4.5/0.5	<1	5			1.5		1.5		1.5	V
			9/1	<1	10			3		3		3	
			13.5/1.5	<1	15			4		4		4	
I_{OH}	Output Drive Current	0/5	2.5	<1	5	-1.36	-3.2		-1.1		-1.1		mA
		0/5	4.6	<1	5	-0.44	-1		-0.36		-0.36		
		0/10	9.5	<1	10	-1.1	-2.6		-0.9		-0.9		
		0/15	13.5	<1	15	-3.0	-6.8		-2.4		-2.4		
I_{OL}	Output Sink Current	0/5	0.4	<1	5	0.44	1		0.36		0.36		mA
		0/10	0.5	<1	10	1.1	2.6		0.9		0.9		
		0/15	1.5	<1	15	3.0	6.8		2.4		2.4		
I_I	Input Leakage Current	0/18	Any Input		18		$\pm 10^{-5}$	±0.1		±1		±1	μA
I_{OZ}	3-State Output Current	0/18			18		$\pm 10^{-4}$	±0.4		±12		±12	μA
C_I	Input Capacitance		Any Input				5	7.5					pF

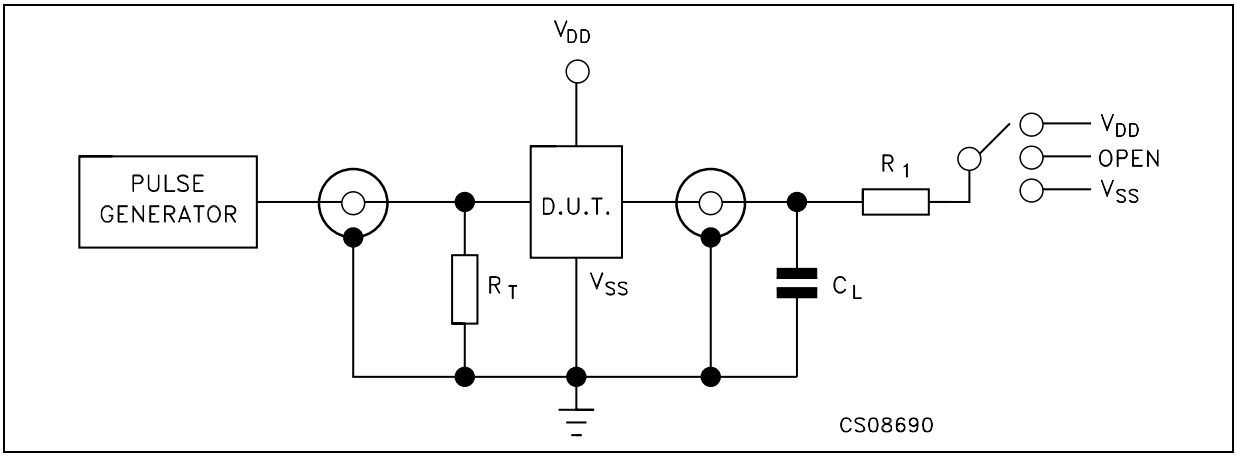
The Noise Margin for both "1" and "0" level is: 1V min. with V_{DD}=5V, 2V min. with V_{DD}=10V, 2.5V min. with V_{DD}=15V

DYNAMIC ELECTRICAL CHARACTERISTICS (T_{amb} = 25°C, C_L = 50pF, R_L = 200KΩ, $t_r = t_f$ = 20 ns)

Symbol	Parameter	Test Condition		Value (*)			Unit
		V_{DD} (V)		Min.	Typ.	Max.	
t_{PLH} t_{PHL}	Propagation Delay Time (Clock to Q Output)	5			300	600	ns
		10			125	250	
		15			90	180	
$t_{PHL(R)}$	Propagation Delay Time (Reset)	5			230	460	ns
		10			100	200	
		15			75	150	
$t_{P(1-H)}$	3-State Out H or L to High Impedance	5	R_L = 1KΩ		150	300	ns
		10			75	150	
		15			60	120	
$t_{P(L-1)}$	3-State High Impedance to H or L Output	5	R_L = 1KΩ		150	300	ns
		10			75	150	
		15			60	120	
t_W	Clock Pulse Width	5		200	100		ns
		10		100	50		
		15		80	40		
t_W	Reset Pulse Width	5		120	60		ns
		10		50	25		
		15		40	20		
t_{setup}	Data Setup Time	5		200	100		ns
		10		80	40		
		15		60	30		
t_{setup}	Data Input Disable Setup Time	5		180	90		ns
		10		100	50		
		15		70	35		
f_{max}	Maximum Clock Frequency	5		3	6		MHz
		10		6	12		
		15		8	16		
t_r, t_f	Clock input Rise or Fall Time	5		15			µs
		10		5			
		15		5			

(*) Typical temperature coefficient for all V_{DD} value is 0.3 %/°C.

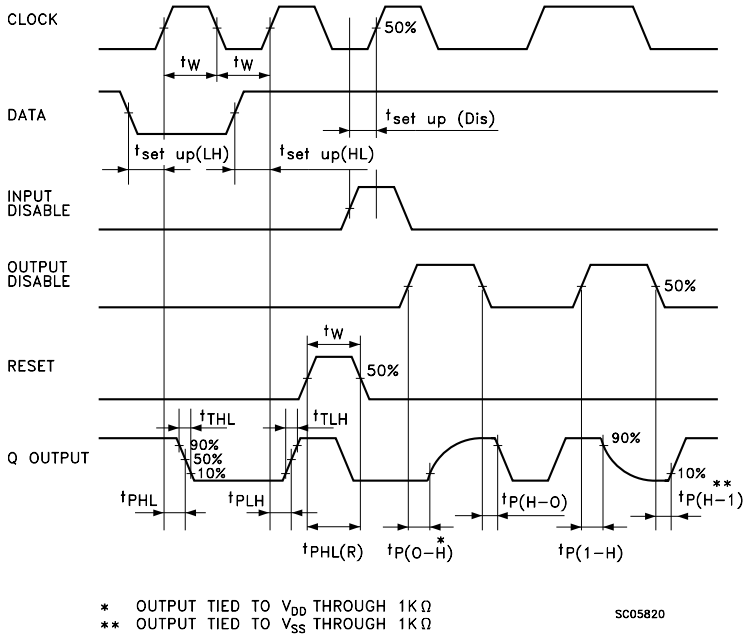
TEST CIRCUIT



TEST	SWITCH
t_{PLH}, t_{PHL}	Open
t_{PZL}, t_{PLZ}	V_{DD}
t_{PZH}, t_{PHZ}	V_{SS}

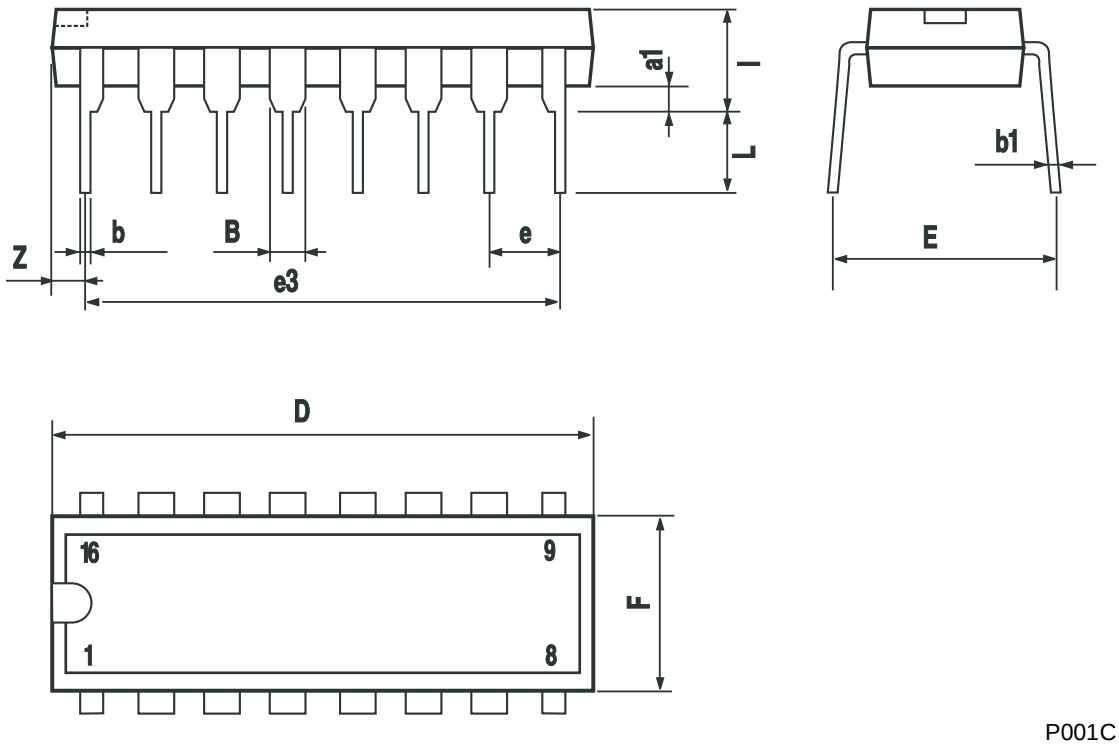
C_L = 50pF or equivalent (includes jig and probe capacitance)
R_L = 200KΩ
R_T = Z_{OUT} of pulse generator (typically 50Ω)

WAVEFORM : PROPAGATION DELAY TIMES (f=1MHz; 50% duty cycle)



Plastic DIP-16 (0.25) MECHANICAL DATA

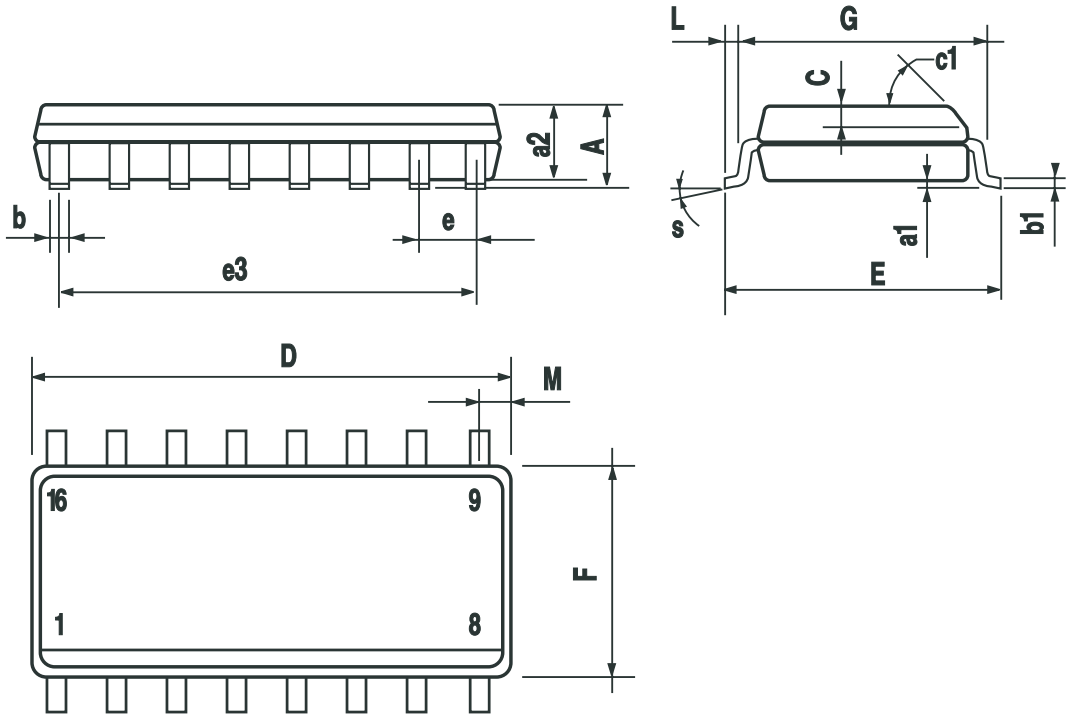
DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
a1	0.51			0.020		
B	0.77		1.65	0.030		0.065
b		0.5			0.020	
b1		0.25			0.010	
D			20			0.787
E		8.5			0.335	
e		2.54			0.100	
e3		17.78			0.700	
F			7.1			0.280
I			5.1			0.201
L		3.3			0.130	
Z			1.27			0.050



P001C

SO-16 MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A			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
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.)					



PO13H