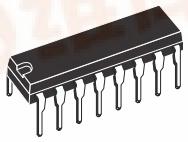
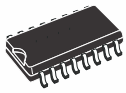
HCF40174B

HEX "D" TYPE FLIP-FLOP

- STANDARDIZED SYMMETRICAL OUTPUT CHARACTERISTICS
- 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

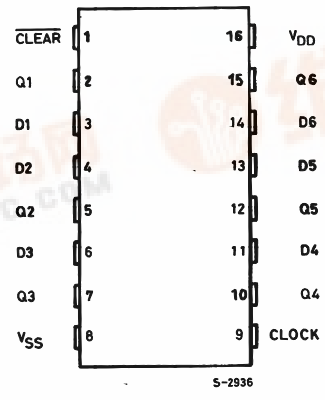
ORDER CODES

PACKAGE	TUBE	T & R
DIP	HCF40174BEY	
SOP	HCF40174BM1	HCF40174M013TR

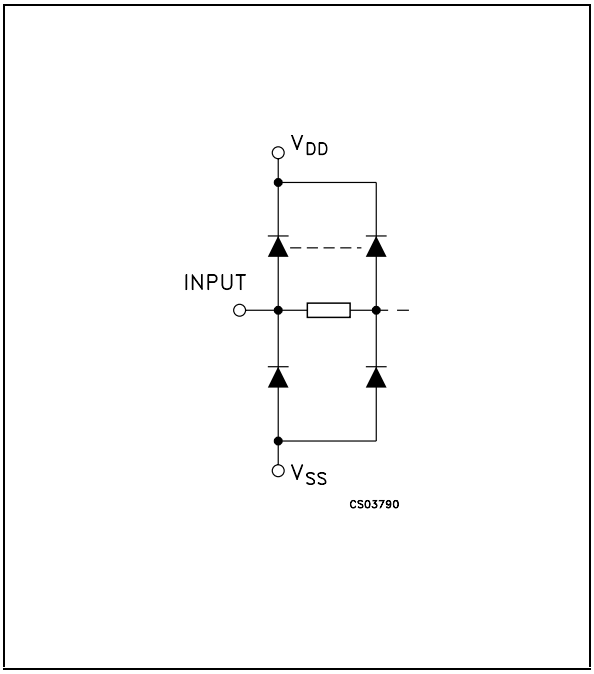
DESCRIPTION

HCF40174B is a monolithic integrated circuit fabricated in Metal Oxide Semiconductor technology available in DIP and SOP packages.
HCF40174B consists of six identical "D" Type flip-flops having independent DATA inputs. The CLOCK and $\overline{\text{CLEAR}}$ inputs are common in all six units. Data is transferred to the Q outputs on the positive-going transition of the clock pulse. All six flip-flops are simultaneously reset by a low level on the $\overline{\text{CLEAR}}$ input.

PIN CONNECTION



IINPUT EQUIVALENT CIRCUIT



PIN DESCRIPTION

PIN No	SYMBOL	NAME AND FUNCTION
3, 4, 6, 11, 13, 14	D1 to D6	Data Inputs
2, 5, 7, 10, 12, 15	Q1 to Q6	Data Outputs
9	CLOCK	Common Clock Inputs
1	$\overline{\text{CLEAR}}$	Common Clear Inputs
8	V_{SS}	Negative Supply Voltage
16	V_{DD}	Positive Supply Voltage

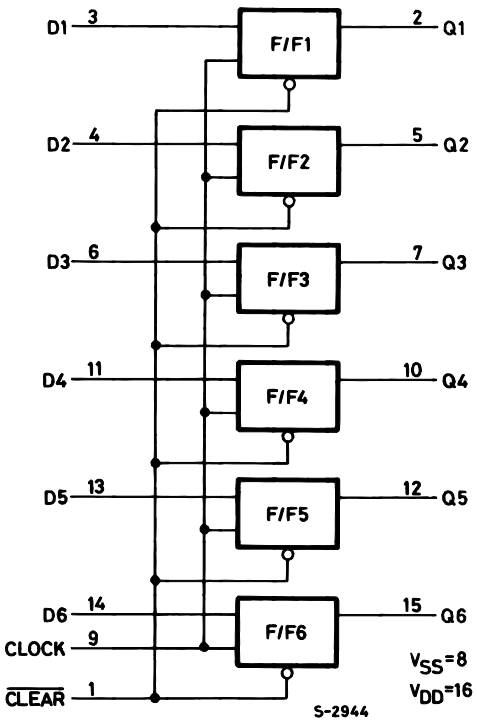
TRUTH TABLE

INPUTS			OUTPUT
CLOCK	DATA	$\overline{\text{CLEAR}}$	Q
⌐¯	L	H	L
⌐¯	H	H	H
¯⌐	X	H	NC
X	X	L	L

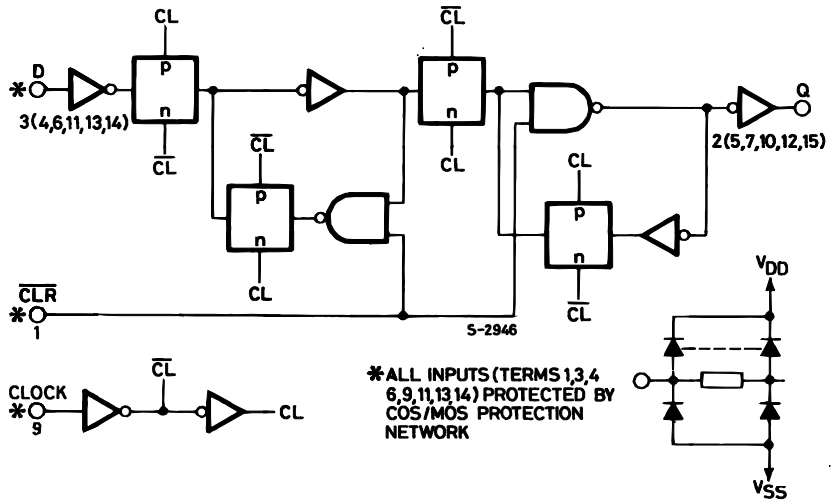
X : Don't Care

NC : NO CHANGE

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		0.02	1		30		30	μA
		0/10			10		0.02	2		60		60	
		0/15			15		0.02	4		120		120	
		0/20			20		0.02	20		600		600	
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	-1.1	-2.6		-0.9		-0.9		mA
		0/5	4.6	<1	5	-0.31	-0.75		-0.25		-0.25		
		0/10	9.5	<1	10	-0.68	-1.6		-0.54		-0.54		
		0/15	13.5	<1	15	-2.3	-5.4		-1.84		-1.84		
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
C_I	Input Capacitance		Any Input				5	7.5					pF

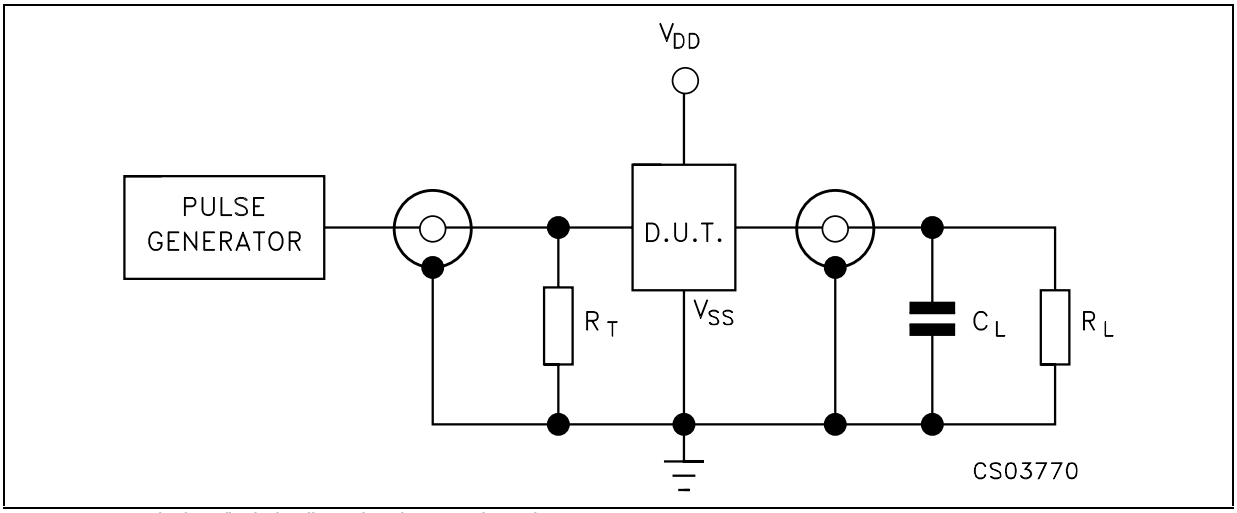
The Noise Margin for both "1" and "0" level is: 1V min. with V_{DD}=5V, 2V min. with V_{DD}=10V, 2.5V min. with V_{DD}=15V

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 Output	5			150	300	ns
		10			70	140	
		15			50	100	
t_{PHL}	Propagation Delay Time : Clear to Output	5			100	200	ns
		10			50	100	
		15			40	80	
t_{THL}, t_{TLH}	Transition Time	5			100	200	ns
		10			50	100	
		15			40	80	
t_{setup}	Data Setup Time	5		40	20		ns
		10		20	10		
		15		10	0		
t_{hold}	Data Hold Time	5		80	40		ns
		10		40	20		
		15		30	15		
t_W	Clock Input Pulse Widht Low Level	5		130	65		ns
		10		60	30		
		15		40	20		
t_W	$\overline{\text{Clear}}$ Input Pulse Widht HIGH and LOW	5		100	50		ns
		10		50	25		
		15		40	20		
t_r, t_f	Clock Input Rise or Fall Time	5				15	µs
		10				15	
		15				15	
t_{rem}	$\overline{\text{Clear}}$ Removal Time	5		0	-40		ns
		10		0	-15		
		15		0	-10		
f_{CL}	Maximum Clock Input Frequency	5		3.5	7		MHz
		10		6	12		
		15		8	16		

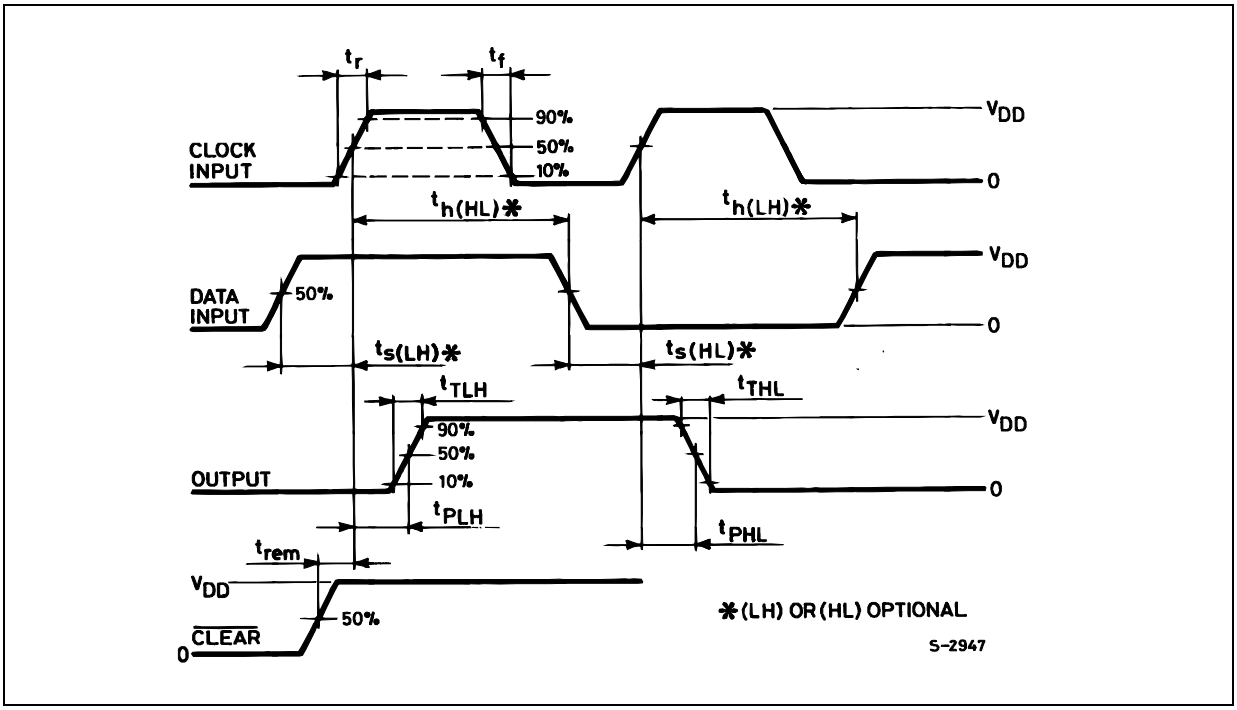
(*) Typical temperature coefficient for all V_{DD} value is 0.3 %/°C.

TEST CIRCUIT



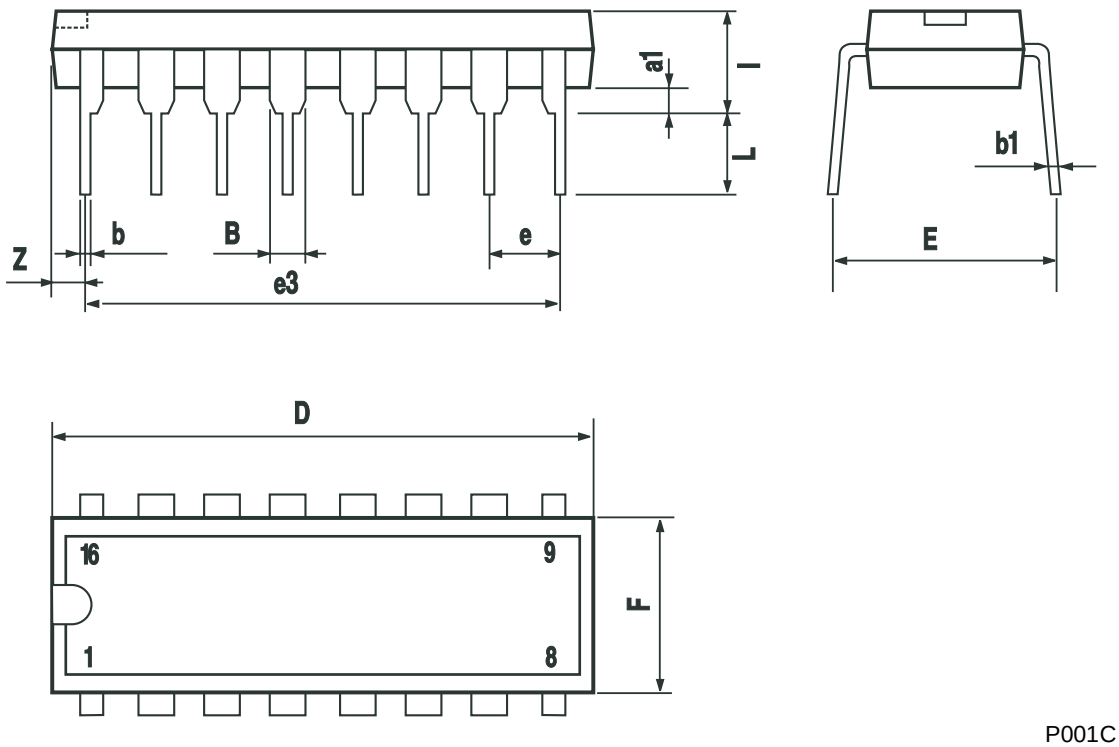
C_L = 50pF or equivalent (includes jig and probe capacitance)
R_L = 200KΩ
R_T = Z_{OUT} of pulse generator (typically 50Ω)

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



Plastic DIP-16 (0.25) MECHANICAL DATA

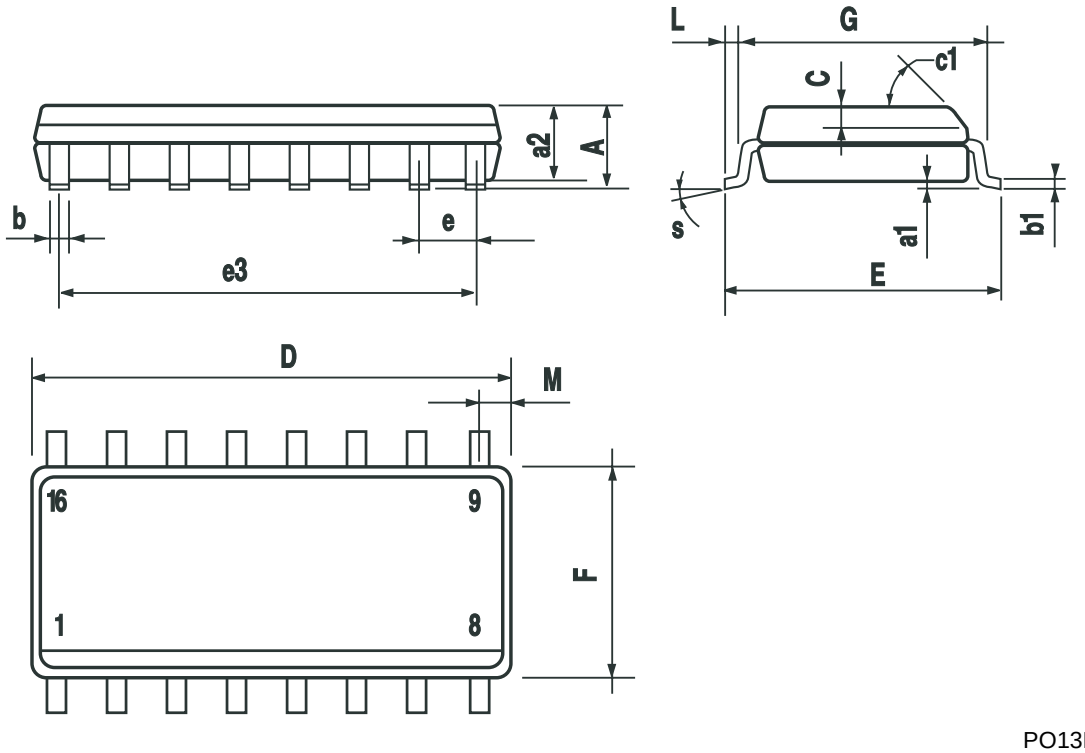
DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
a1	0.51			0.020		
B	0.77		1.65	0.030		0.065
b		0.5			0.020	
b1		0.25			0.010	
D			20			0.787
E		8.5			0.335	
e		2.54			0.100	
e3		17.78			0.700	
F			7.1			0.280
I			5.1			0.201
L		3.3			0.130	
Z			1.27			0.050



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