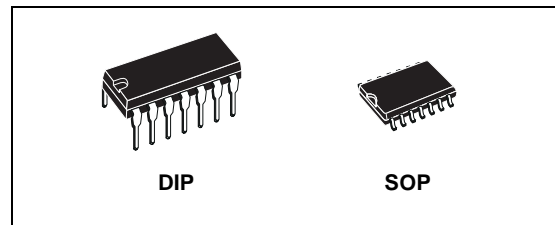# HCF4047B

LOW POWER MONOSTABLE/ASTABLE MULTIVIBRATOR

- LOW POWER CONSUMPTION : SPECIAL CMOS OSCILLATOR CONFIGURATION
- MONOSTABLE (one - shot) OR ASTABLE (free-running) OPERATION
- TRUE AND COMPLEMENTED BUFFERED OUTPUTS
- ONLY ONE EXTERNAL R AND C REQUIRED
- BUFFERED INPUTS
- QUIESCENT CURRENT SPECIFIED UP TO 20V
- STANDARDIZED, SYMMETRICAL OUTPUT CHARACTERISTICS
- 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	HCF4047BEY	
SOP	HCF4047BM1	HCF4047M013TR

DESCRIPTION

The HCF4047B is a monolithic integrated circuit fabricated in Metal Oxide Semiconductor technology available in DIP and SOP packages.

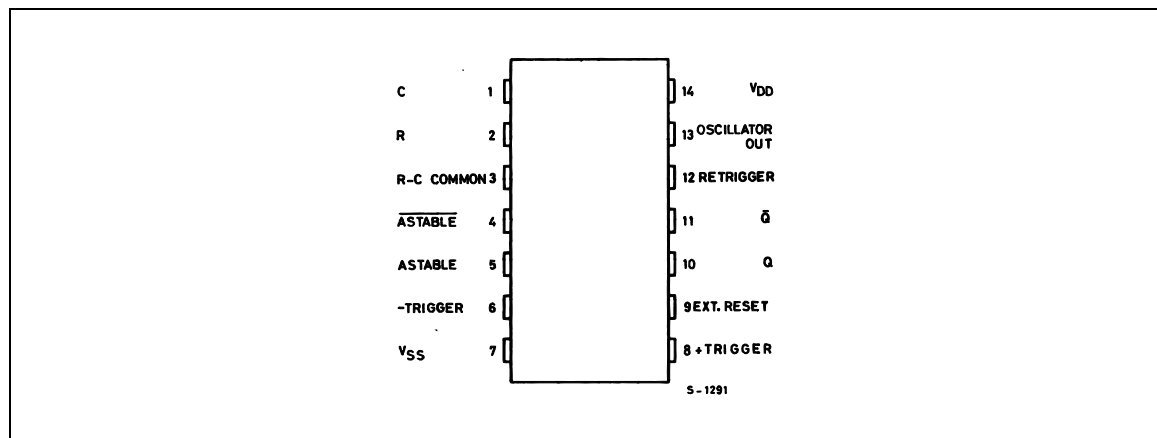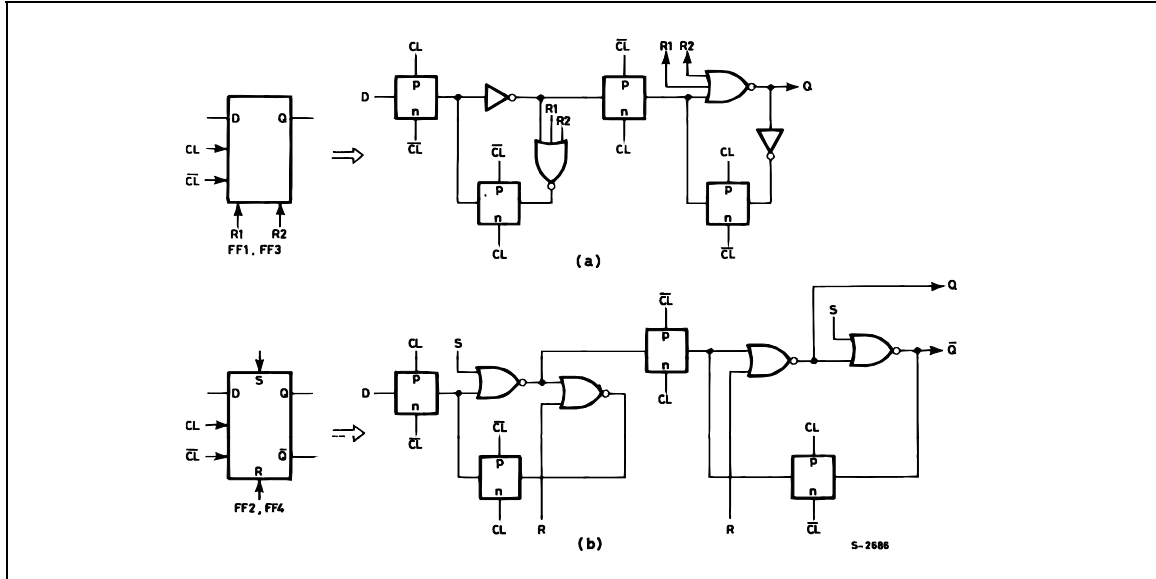The HCF4047B consist of a gatable astable multivibrator with logic techniques incorporated to permit positive or negative edge-triggered monostable multivibrator action with retriggering and external counting options. Inputs include +TRIGGER -TRIGGER, ASTABLE, ASTABLE, RETRIGGER, and EXTERNAL RESET. Buffered outputs are Q, Q̄ and OSCILLATOR. In all modes of operation, an external capacitor must be connected between C-Timing and RC-Common terminals, and an external resistor must be connected between the R-Timing and RC-Common terminals.

For operating modes see functional terminal connections and application notes.

PIN CONNECTION

Pin	Name
C	1
R	2
R-C COMMON	3
ASTABLE (ASTABLĒ)	4
ASTABLE	5
-TRIGGER	6
V_{SS}	7
+TRIGGER	8
EXT. RESET	9
Q	10
Q̄	11
RETRIGGER	12
OSCILLATOR OUT	13
V_{DD}	14

S - 1291

DETAIL FOR FLIP-FLOPS FF1 AND FF3 (a) AND FOR FLIP-FLOPS FF2 AND FF4 (b)

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	$\pm$ 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		0.01	1		30		30	µA
		0/10			10		0.01	2		60		60	
		0/15			15		0.01	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	-1.36	-3.2		-1.15		-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		$\pm10^{-5}$	±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	Astable, Astable to Osc. Out	5			200	400	ns
			10			100	200	
			15			80	160	
		Astable, Astable to Q, $\overline{Q}$	5			350	700	
			10			175	350	
			15			125	250	
		+ or - Trigger to Q, $\overline{Q}$	5			500	1000	
			10			225	450	
			15			150	300	
		Retrigger to Q, $\overline{Q}$	5			300	600	
			10			150	300	
			15			100	200	
		External Reset to Q, $\overline{Q}$	5			250	500	
			10			100	200	
			15			70	140	
t_{THL} t_{TLH}	Transition Time Osc. Out Q, $\overline{Q}$		5			100	200	ns
			10			50	100	
			15			40	80	
t_W	Input Pulse Width	+ Trigger - Trigger	5			200	400	ns
			10			80	160	
			15			50	100	
		Reset	5			100	200	
			10			50	100	
			15			30	60	
		Retrigger	5			300	600	
			10			115	230	
			15			75	150	
t_r, t_f	Input Rise and Fall Time All Inputs		5					μs
			10			Unlimited		
			15					
	Q or $\overline{Q}$ Deviation from 50% Duty Factor		5			±0.5	±1	%
			10			±0.5	±1	
			15			±0.1	±0.5	

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

APPLICATION INFORMATION
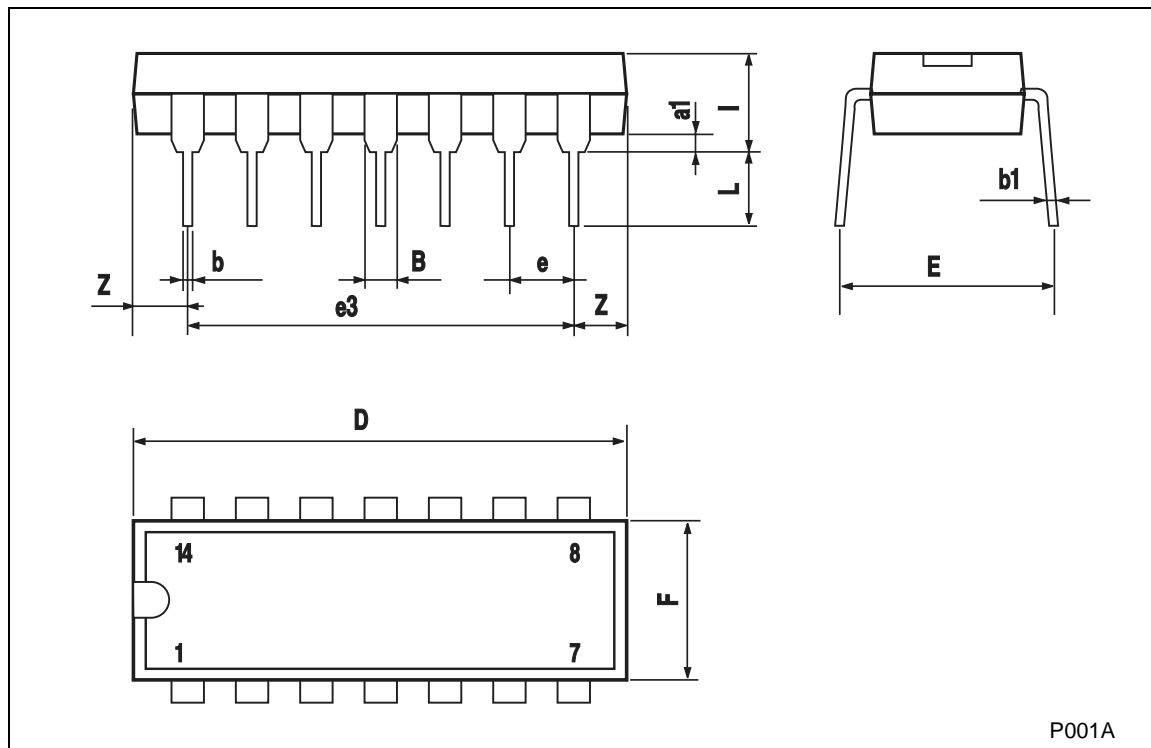
1 - CIRCUIT DESCRIPTION
Astable operation is enabled by a high level on the ASTABLE input. The period of the square wave at the Q and $\overline{Q}$ Outputs in this mode of operation is a function of the external components employed. "True" input pulses on the ASTABLE input or "Complement" pulses on the $\overline{ASTABLE}$ input allow the circuit to be used as a gatable multivibrator. The OSCILLATOR output period will be half of the Q terminal output in the astable mode. However, a 50% duty cycle is not guaranteed at this output. In the monostable mode, positive-edge triggering is accomplished by application of a leading-edge pulse to the +TRIGGER input and a low level to the -TRIGGER input. For negative-edge triggering, a trailing-edge pulse is applied to the -TRIGGER and a high level is applied to the +TRIGGER. Input pulses may be of any duration relative to the output pulse. The multivibrator can be retriggered (on the leading edge only) by applying a common pulse to both the RETRIGGER and +TRIGGER inputs. In this mode the output pulse remains high as long as the input pulse period is shorter than the period determined by the RC components. An external countdown option can be implemented by

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Plastic DIP-14 MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
a1	0.51			0.020		
B	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	
e		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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