

Data sheet acquired from Harris Semiconductor SCHS065C – Revised November 2004

# CD4098B Types

## **CMOS Dual Monostable** Multivibrator

High-Voltage Types (20-Volt Rating)

■ CD4098B dual monostable multivibrator provides stable retriggerable/resettable one-shot operation for any fixed-voltage timing application.

An external resistor (Rx) and an external capacitor (CX) control the timing for the circuit. Adjustment of RX and CX provides a wide range of output pulse widths from the Q and Q terminals. The time delay from trigger input to output transition (trigger propagation delay) and the time delay from reset input to output transition (reset propagation delay) are independent of Rx and CX.

Leading-edge-triggering (+TR) and trailingedge-triggering (-TR) inputs are provided for triggering from either edge of an input pulse. An unused +TR input should be tied to VSS. An unused -TR input should be tied to VDD. A RESET (on low level) is provided for immediate termination of the output pulse or to prevent output pulses when power is turned on. An unused RESET input should be tied to VDD. However, if an entire section of the CD4098B is not used, its RESET should be tied to VSS. See Table I.

In normal operation the circuit triggers (extends the output pulse one period) on the application of each new trigger pulse. For operation in the non-retriggerable mode, Q is connected to -TR when leading-edge triggering (+TR) is used or Q is connected to +TR when trailing-edge triggering (-TR) is used.

The time period (T) for this multivibrator can be approximated by:  $T_X=\frac{1}{2}R_XC_X$  for  $C_X \ge$ 0.01 µF. Time periods as a function of Rx for values of CX and VDD are given in Fig. 8. Values of T vary from unit to unit and as a function of voltage, temperature, and RXCX.

The minimum value of external resistance,  $R_X$ , is 5 k $\Omega$ . The maximum value of external capacitance,  $C_X$ , is 100  $\mu F$ . Fig. 9 shows time periods as a function of  $C_X$  for values of  $R_X$ and VDD.

The output pulse width has variations of ±2.5% typically, over the temperature range of -55°C to 125°C for Cx=1000 pF and  $R_X=100 k\Omega$ .

For power supply variations of ±5%, the output pulse width has variations of ±0.5% typically, for VDD=10 V and 15 V and ±1% typically, for VDD=5 V at Cx=1000 pF and  $R_X=5 k\Omega$ .

These types are supplied in 16-lead hermetic dual-in-line ceramic packages (F3A suffix), 16-lead dual-in-line plastic packages (E suffix). 16-lead small-outline packages (M, M96, and MT suffixes), and 16-lead thin shrink smalloutline packages (PW and PWR suffixes).

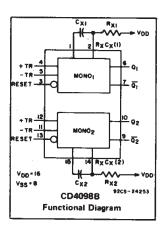
The CD4098B is similar to type MC14528.

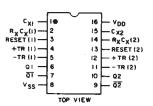
#### Features:

- Retriggerable/resettable capability
- Trigger and reset propagation delays independent of R<sub>X</sub>, C<sub>X</sub>
- Triggering from leading or trailing edge
- Q and Q buffered outputs available
- Separate resets
- Wide range of output-pulse widths
- 100% tested for maximum quiescent current at 20 V
- Maximum input current of 1 µA at 18 V over full package-temperature range; 100 nA at 18 V and 25°C
- Noise margin (full package-temperature range): 1 V at V<sub>DD</sub>= 5 V 2 V at V<sub>DD</sub>=10 V 2.5 V at V<sub>DD</sub>=15 V 5-V, 10-V, and 15-V parametric ratings
- Standardized, symmetrical output characteristics
- Meets all requirements of JEDEC Tentative Standard No. 13B, "Standard Specifications for Description of 'B' Series CMOS Devices."

#### Applications:

- Pulse delay and timing
- Pulse shaping
- Astable multivibrator





TERMINALS 1,8,15 ARE ELECTRICALLY CONNECTED INTERNALLY

92CS-24848RI

**TERMINAL ASSIGNMENT** 

#### MAXIMUM RATINGS, Absolute-Maximum Values:

	DC SUPPLY-VOLTAGE RANGE, (VDD)
	Voltages referenced to VSS Terminal)
0.5V to V <sub>DD</sub> +0.5V	INPUT VOLTAGE RANGE, ALL INPUTS
±10mA	
y):	POWER DISSIPATION PER PACKAGE (P
500mW	For T <sub>A</sub> = -55°C to +100°C
Derate Linearity at 12mW/°C to 200mW	For TA = +100°C to +125°C
	DEVICE DISSIPATION PER OUTPUT TRA
RE RANGE (All Package Types) 100mW	FOR TA = FULL PACKAGE-TEMPERAT
	OPERATING-TEMPERATURE RANGE (TA
	STORAGE TEMPERATURE RANGE (Tstg)
	LEAD TEMPERATURE (DURING SOLDER
mm) from case for 10s max +265°C	At distance $1/16 \pm 1/32$ inch $(1.59 \pm 0.79)$

#### **RECOMMENDED OPERATING CONDITIONS**

For maximum reliability, nominal operating conditions should be selected so that operation is always within the following ranges:

CHARACTERISTIC	V <sub>DD</sub>	LIN	IITS	UNITS	
CHARACTERISTIC	V	MIN	MAX.	UNIIS	
Supply-Voltage Range (For TA = Full Package-Temperature Range)	_	3	18	V	
Trigger Pulse Width t <sub>W</sub> (TR)	5 10 15	140 60 40	-	กร	
Reset Pulse Width tw(R) (This is a function of C <sub>X</sub> )		So Dynami Chart Fig.	-		
Trigger Rise or Fall Time t <sub>r</sub> (TR), t <sub>f</sub> (TR)	5 - 15	-	100	μs	

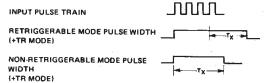
### CD4098B Types

TABLE I
CD4098B FUNCTIONAL TERMINAL CONNECTIONS

FUNCTION		TO 1. NO.		TO M. NO.	l -	PULSE RM. NO.	OTHER CONNECTIONS		
	MONO <sub>1</sub>	MONO <sub>2</sub>							
Leading-Edge Trigger/ Retriggerable	3, 5	11, 13			4	12			
Leading-Edge Trigger/ Non-retriggerable	3	13			4	12	5-7	11-9	
Trailing-Edge Trigger/ Retriggerable	3.	13	4	12	5	11			
Trailing-Edge Trigger/ Non-retriggerable	3	13	:		5	11	4-6	12-10	
Unused Section	5	11	3, 4	12, 13					

#### NOTES:

- 1. A RETRIGGERABLE ONE-SHOT MULTI-VIBRATOR HAS AN OUTPUT PULSE WIDTH WHICH IS EXTENDED ONE FULL TIME PERIOD (T<sub>X</sub>) AFTER APPLICATION OF THE LAST TRIGGER PULSE.
- The minimum time between retriggering edges (or trigger and retrigger edges) is 40 per cent of (T<sub>X</sub>).
- 2. A NON-RETRIGGERABLE ONE-SHOT MULTIVIBRATOR HAS A TIME PERIOD TX REFERENCED FROM THE APPLICATION OF THE FIRST TRIGGER PULSE.



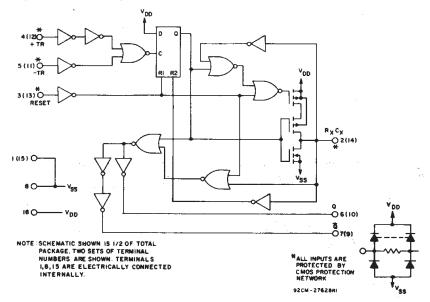


Fig. 4 — CD4098B logic diagram.

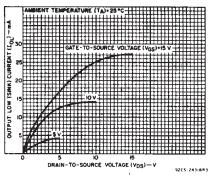


Fig. 1 — Typical output low (sink) current characteristics.

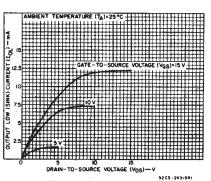


Fig. 2 — Minimum output low (sink) current characteristics.

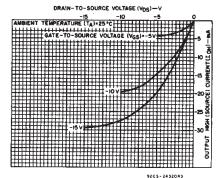


Fig. 3 — Typical output high (source) current characteristics.

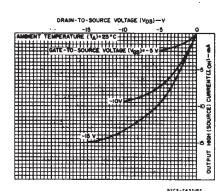


Fig. 5 - Minimum output high (source) current characteristics.

Copyright © 2004, Texas Instruments Incorporated

## CD4098B Types

### STATIC ELECTRICAL CHARACTERISTICS

										1
		NS_	LIMIT	rs at ii	NDICAT	ED TEN	IPERA:	TURES (	PC)	UNITS
Vo.	VIN	V <sub>DD</sub>					1	+25	26.744	3.4
(V)	(V)	(V)	-55	<b>-40</b>	+85	+125	Min.	Тур.	Max.	1
	0,5	5	1	1	30	30	_	0.02	1	
			2	2	60	60	_	0.02	2	1 .
_			4	4	120	120	_	0.02	4	μА
_	0,20	20	20	20	600	600	_	0.04	20	1
					:				<del>                                     </del>	<u> </u>
0.4	0,5	5	0.64	0.61	0.42	0.36	0.51	1	l _	ł
0.5	0,10	10	1.6	1.5	1.1	0.9	1.3	2.6	_	1
1.5	0,15	15	4.2	4	2.8	2.4	3.4	6.8	<u> </u>	[ ]
4.6	0,5	5	-0.64	-0.61	-0.42	-0.36	-0.51	-1	-	mA
2.5	0,5	5	-2	-1.8	-1.3	-1.15	-1.6	-3.2	_	1
9.5	0,10	10	-1.6	-1.5	-1.1	-0.9	-1.3	-2.6		
13.5	0,15	15	-4.2	-4	-2.8	-2.4	-3.4	-6.8	-	1 .
			1			Ц	1	-		<b>—</b>
	0,5	5		0.0	)5		_	0	0.05	
_	0,10	10		0.0	)5			0		
_	0,15	15		0.0	)5			0	0.05	
					······			<del></del>	1	V
	0.5	5		4.9	15		4 95	<sub>5</sub>		٠
_		10								
_	0,15	15					14.95	. 15	_	
0.5,4.5	-	5		1.	5				15	
1,9	_	10		3						
1.5,13.5	-	15		4			_		4	
0.5,4.5	1	-5	3.5			3.5	_		٧	
1,9	-	10	7 11			7				
1.5,13.5		15				11	-	_		
				Т				<del></del> -	$\vdash$	
:-	0,18	18	±0.1	±0.1	±1	±1	-	±10 <sup>-5</sup>	±0.1	μΑ
	VO (V) 	VO (V) (V)  - 0,5 - 0,10 - 0,20  0.4 0,5 0.5 0,10 1.5 0,15 4.6 0,5 2.5 0,5 9.5 0,10 13.5 0,15 - 0,10 - 0,15 - 0,10 - 0,15 - 0,10 - 0,15 0.5,4.5 - 0,10 1.5,13.5 - 0 1.5,13.5 - 0	(V)         (V)         (V)           -         0,5         5           -         0,10         10           -         0,15         15           -         0,20         20           0.4         0,5         5           0.5         0,10         10           1.5         0,15         15           4.6         0,5         5           9.5         0,10         10           13.5         0,15         15           -         0,10         10           -         0,10         10           -         0,15         15           -         0,10         10           -         0,15         15           -         0,10         10           -         0,15         15           0.5         5         -           -         0,10         10           -         0,15         15           0.5,4.5         -         5           1,9         -         10           1.5,13.5         -         15	VO (V)         VIN (V)         VDD (V)         -55           -         0,5         5         1           -         0,10         10         2           -         0,15         15         4           -         0,20         20         20           0.4         0,5         5         0.64           0.5         0,10         10         1.6           1.5         0,15         15         4.2           4.6         0,5         5         -0.64           2.5         0,5         5         -0.64           2.5         0,5         5         -2           9.5         0,10         10         -1.6           13.5         0,15         15         -4.2           -         0,15         15         -4.2           -         0,15         15         -4.2           -         0,15         15         -4.2           -         0,15         15         -4.2           -         0,15         15         -4.2           -         0,15         15         -5           -         0,15         15         -5	VO (V)         VIN (V)         VDD (V)         -55         -40           -         0,5         5         1         1           -         0,10         10         2         2           -         0,15         15         4         4           -         0,20         20         20         20           0.4         0,5         5         0.64         0.61           0.5         0,10         10         1.6         1.5           1.5         0,15         15         4.2         4           4.6         0,5         5         -0.64         -0.61           2.5         0,5         5         -0.64         -0.61           2.5         0,5         5         -2         -1.8           9.5         0,10         10         -1.6         -1.5           13.5         0,15         15         -4.2         -4           -         0,5         5         0.0         -0.0           -         0,15         15         0.0         0.0           -         0,15         15         0.0         0.0           -         0,15         15	VO (V)         VIN (V)         VDD (V)         -55         -40         +85           -         0,5         5         1         1         30           -         0,10         10         2         2         60           -         0,15         15         4         4         120           -         0,20         20         20         20         600           0.4         0,5         5         0.64         0.61         0.42           0.5         0,10         10         1.6         1.5         1.1           1.5         0,15         15         4.2         4         2.8           4.6         0,5         5         -0.64         -0.61         -0.42           2.5         0,5         5         -0.64         -0.61         -0.42           2.5         0,5         5         -2         -1.8         -1.3           9.5         0,10         10         -1.6         -1.5         -1.1           13.5         0,15         15         -4.2         -4         -2.8           -         0,15         15         0.05           -         0,15 <td< td=""><td>VO (V)         VIN (V)         VDD (V)         -55         -40         +85         +125           -         0,5         5         1         1         30         30           -         0,10         10         2         2         60         60           -         0,15         15         4         4         120         120           -         0,20         20         20         20         600         600           0.4         0,5         5         0.64         0.61         0.42         0.36           0.5         0,10         10         1.6         1.5         1.1         0.9           1.5         0,15         15         4.2         4         2.8         2.4           4.6         0,5         5         -0.64         -0.61         -0.42         -0.36           2.5         0,5         5         -0.64         -0.61         -0.42         -0.36           2.5         0,5         5         -2         -1.8         -1.1         -0.9           13.5         0,15         15         -4.2         -4         -2.8         -2.4           -         0,5</td><td>VO (V)         VIN (V)         VDD (V)         -55         -40         +85         +125         Min.           -         0,5         5         1         1         30         30         -           -         0,10         10         2         2         60         60         -           -         0,15         15         4         4         120         120         -           -         0,20         20         20         20         600         600         -           -         0,20         20         20         20         600         600         -           -         0,20         20         20         600         600         -           -         0,20         20         20         600         600         -           -         0,10         10         1.6         1.5         1.1         0.9         1.3           1.5         0,15         15         4.2         4         2.8         2.4         3.4           4.6         0,5         5         -0.64         -0.61         -0.42         -0.36         -0.51           2.5         0,5         5</td><td>VO (V)         VIN (V)         VDD (V)         -55         -40         +85         +125         Min.         Typ.           -         0,5         5         1         1         30         30         -         0.02           -         0,10         10         2         2         60         60         -         0.02           -         0,15         15         4         4         120         120         -         0.02           -         0,20         20         20         20         600         600         -         0.02           -         0,20         20         20         600         600         -         0.02           -         0,20         20         20         600         600         -         0.02           -         0,10         10         1.6         1.5         1.1         0.9         1.3         2.6           1.5         0,15         15         4.2         4         2.8         2.4         3.4         6.8           4.6         0.5         5         -0.64         -0.61         -0.42         -0.36         -0.51         -1           2.5</td><td>VO (V)         VIN (V)         VDD (V)         -55         -40         +85         +125         Min.         Typ.         Max.           -         0,5         5         1         1         30         30         -         0.02         1           -         0,10         10         2         2         60         60         -         0.02         2           -         0,15         15         4         4         120         120         -         0.02         4           -         0,20         20         20         600         600         -         0.02         4           -         0,20         20         20         600         600         -         0.02         4           -         0,20         20         20         600         600         -         0.02         4           -         0,5         5         0.64         0.61         0.42         0.36         0.51         1         -           0.5         0,10         10         1.6         1.5         1.1         0.9         1.3         2.6         -           1.5         0,5         5         -0.64</td></td<>	VO (V)         VIN (V)         VDD (V)         -55         -40         +85         +125           -         0,5         5         1         1         30         30           -         0,10         10         2         2         60         60           -         0,15         15         4         4         120         120           -         0,20         20         20         20         600         600           0.4         0,5         5         0.64         0.61         0.42         0.36           0.5         0,10         10         1.6         1.5         1.1         0.9           1.5         0,15         15         4.2         4         2.8         2.4           4.6         0,5         5         -0.64         -0.61         -0.42         -0.36           2.5         0,5         5         -0.64         -0.61         -0.42         -0.36           2.5         0,5         5         -2         -1.8         -1.1         -0.9           13.5         0,15         15         -4.2         -4         -2.8         -2.4           -         0,5	VO (V)         VIN (V)         VDD (V)         -55         -40         +85         +125         Min.           -         0,5         5         1         1         30         30         -           -         0,10         10         2         2         60         60         -           -         0,15         15         4         4         120         120         -           -         0,20         20         20         20         600         600         -           -         0,20         20         20         20         600         600         -           -         0,20         20         20         600         600         -           -         0,20         20         20         600         600         -           -         0,10         10         1.6         1.5         1.1         0.9         1.3           1.5         0,15         15         4.2         4         2.8         2.4         3.4           4.6         0,5         5         -0.64         -0.61         -0.42         -0.36         -0.51           2.5         0,5         5	VO (V)         VIN (V)         VDD (V)         -55         -40         +85         +125         Min.         Typ.           -         0,5         5         1         1         30         30         -         0.02           -         0,10         10         2         2         60         60         -         0.02           -         0,15         15         4         4         120         120         -         0.02           -         0,20         20         20         20         600         600         -         0.02           -         0,20         20         20         600         600         -         0.02           -         0,20         20         20         600         600         -         0.02           -         0,10         10         1.6         1.5         1.1         0.9         1.3         2.6           1.5         0,15         15         4.2         4         2.8         2.4         3.4         6.8           4.6         0.5         5         -0.64         -0.61         -0.42         -0.36         -0.51         -1           2.5	VO (V)         VIN (V)         VDD (V)         -55         -40         +85         +125         Min.         Typ.         Max.           -         0,5         5         1         1         30         30         -         0.02         1           -         0,10         10         2         2         60         60         -         0.02         2           -         0,15         15         4         4         120         120         -         0.02         4           -         0,20         20         20         600         600         -         0.02         4           -         0,20         20         20         600         600         -         0.02         4           -         0,20         20         20         600         600         -         0.02         4           -         0,5         5         0.64         0.61         0.42         0.36         0.51         1         -           0.5         0,10         10         1.6         1.5         1.1         0.9         1.3         2.6         -           1.5         0,5         5         -0.64

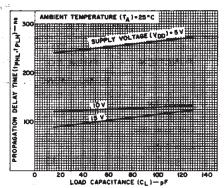


Fig. 6 - Typical propagation delay time vs.
load capacitance, trigger into Q
out. (All values of C<sub>X</sub> and R<sub>X</sub>.)

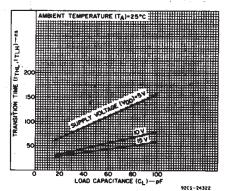


Fig. 7 – Transition time vs. load capacitance for  $R_X$  = 5 k $\Omega$ -10000 k $\Omega$  and  $C_X$  = 15 pF-10000 pF.

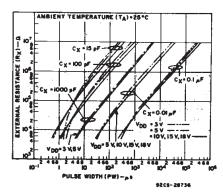


Fig. 8 — Typical external resistance vs. pulse width.

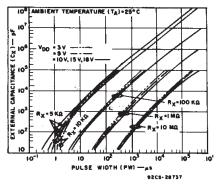


Fig. 9 – Typical external capacitance vs. pulse width.

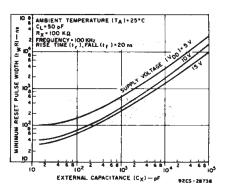


Fig. 10 – Typical minimum reset pulse width vs. external capacitance.

#### **DYNAMIC ELECTRICAL CHARACTERISTICS**

At  $T_A = 25^{\circ}C$ ; Input  $t_r, t_f = 20$  ns,  $C_L = 50$  pF,  $R_L = 200$  k $\Omega$ 

CHARACTERISTIC	TEST	CONDITI	ONS	LIM	ITS	LIAUTO			
CHARACTERISTIC	R <sub>X</sub> (kΩ)	C <sub>X</sub> (pF)	V <sub>DD</sub> (V)	Тур.	Max.	UNITS			
Trigger Propagation Delay Time	5 to		5	250	500				
+TR, -TR to Q, Q	10,000	≥15	- 10	125	250	ns			
<sup>t</sup> PHL <sup>, t</sup> PLH	10,000		15	100	200				
Minimum Trigger Pulse Width,	5 to		5	70	140				
<b>*</b> *	10,000 ≥15		10	30	60	ns			
t <sub>WH</sub> , t <sub>WL</sub>	10,000		15	20	40				
Transition Time,	5 to .		- 5	100	200				
<sup>t</sup> TLH	10,000	≥15	10	50	100				
	10,000		15	40	80				
	5 to	15 to	5	100	200				
	10,000	10,000	10	50	100				
			15	40	80				
	5 to	0.01 μF	5	150	300	ns			
<sup>t</sup> THL	10,000	to	10	75	150				
		0.1 μF	15	65	130				
	5 to	0.1 μF	5	250	500				
	10,000	to	10	150	300				
		1 μF	15	80	160				
Reset Propagation Delay Time,	5 to		5	225	450	1			
T <sub>PHL</sub> , T <sub>PLH</sub>			10,000		≥15	10	125	250	ns
riit, rtii			15	75	150				
			5	100	200				
		15	10	40	80				
			15	30	60	ns			
Minimum Reset Pulse Width,			5	600	1200				
t <sub>W</sub> R	100	1000	10	300	600				
•			15	250	500				
			5	25	50				
		0.1 μF	10	15	30	μs			
			15	10	20				
Trigger Rise or Fall Time	_	_	5 to	_	100	μs			
t <sub>r</sub> (TR), t <sub>f</sub> (TR)		See Sec.	15						
Pulse Width Match		'n	5	5	10	1			
Between Circuits in	10	10,000	10	7.5	15	- %			
Same Package			15	7.5	15	4,			
Input Capacitance, CIN		Any Input		5	7.5	ρF			

#### **TEST CIRCUITS**

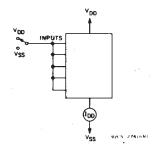


Fig. 12 — Quiescent-device-current test circuits.

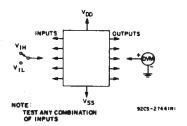


Fig. 13 - Input-voltage test circuit.

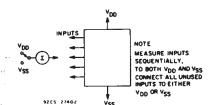


Fig. 14 — Input leakage current test circuit.

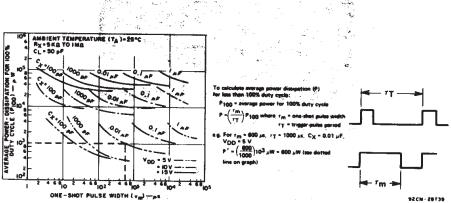


Fig. 11 - Average power dissipation vs. one-shot pulse width.

## CD4098B Types

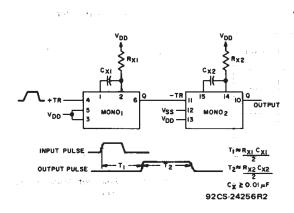


Fig. 15 - Pulse delay.

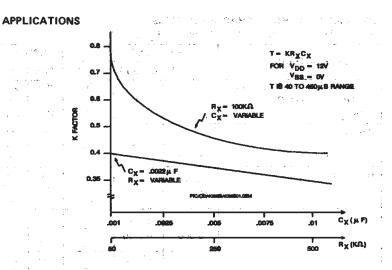


Fig. 17 - K-Factor for  $V_{DD} = 12V$ .

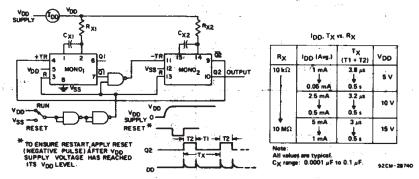
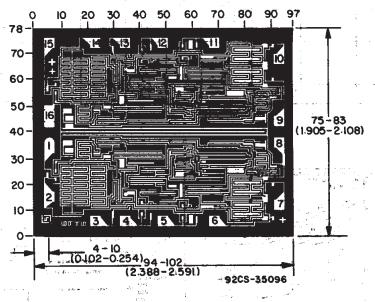


Fig. 16 - Astable multivibrator with restart after reset capability.



Dimensions and Pad Layout for CD4098BH

Dimensions in parentheses are in millimeters and are derived from the basic inch dimensions as indicated. Grid graduations are in mils (10<sup>-3</sup> inch).

25-Jan-2012

#### **PACKAGING INFORMATION**

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan <sup>(2)</sup>	Lead/ Ball Finish	MSL Peak Temp <sup>(3)</sup>	Samples (Requires Login)
CD4098BE	ACTIVE	PDIP	N	16	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	
CD4098BEE4	ACTIVE	PDIP	N	16	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	
CD4098BF	ACTIVE	CDIP	J	16	1	TBD	A42	N / A for Pkg Type	
CD4098BF3A	ACTIVE	CDIP	J	16	1	TBD	A42	N / A for Pkg Type	
CD4098BFB	ACTIVE	CDIP	J	16	1	TBD	Call TI	Call TI	
CD4098BM	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
CD4098BM96	ACTIVE	SOIC	D	16	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
CD4098BM96E4	ACTIVE	SOIC	D	16	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
CD4098BM96G4	ACTIVE	SOIC	D	16	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
CD4098BME4	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
CD4098BMG4	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
CD4098BMT	ACTIVE	SOIC	D	16	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
CD4098BMTE4	ACTIVE	SOIC	D	16	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
CD4098BMTG4	ACTIVE	SOIC	D	16	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
CD4098BPW	ACTIVE	TSSOP	PW	16	90	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
CD4098BPWE4	ACTIVE	TSSOP	PW	16	90	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
CD4098BPWG4	ACTIVE	TSSOP	PW	16	90	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
CD4098BPWR	ACTIVE	TSSOP	PW	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
CD4098BPWRE4	ACTIVE	TSSOP	PW	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	



www.ti.com

### PACKAGE OPTION ADDENDUM

25-Jan-2012

Orderable Device	Status <sup>(1)</sup>	Package Type	Package Drawing	Pins	Package Qty	Eco Plan <sup>(2)</sup>	Lead/ Ball Finish	MSL Peak Temp <sup>(3)</sup>	Samples (Requires Login)
CD4098BPWRG4	ACTIVE	TSSOP	PW	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
JM38510/17504BEA	ACTIVE	CDIP	J	16	1	TBD	A42	N / A for Pkg Type	
M38510/17504BEA	ACTIVE	CDIP	J	16	1	TBD	A42	N / A for Pkg Type	

(1) The marketing status values are defined as follows:

ACTIVE: Product device recommended for new designs.

LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

PREVIEW: Device has been announced but is not in production. Samples may or may not be available.

**OBSOLETE:** TI has discontinued the production of the device.

(2) Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check http://www.ti.com/productcontent for the latest availability information and additional product content details.

**TBD:** The Pb-Free/Green conversion plan has not been defined.

**Pb-Free** (RoHS): TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

**Pb-Free (RoHS Exempt):** This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

(3) MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

**Important Information and Disclaimer:** The information provided on this page represents TI's knowledge and belief as of the date that it is provided. TI bases its knowledge and belief on information provided by third parties, and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. TI has taken and continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. TI and TI suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.

In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

#### OTHER QUALIFIED VERSIONS OF CD4098B, CD4098B-MIL:

Catalog: CD4098B

Military: CD4098B-MIL





ww.ti.com 25-Jan-2012

NOTE: Qualified Version Definitions:

- Catalog TI's standard catalog product
- Military QML certified for Military and Defense Applications

## PACKAGE MATERIALS INFORMATION

www.ti.com 30-Jul-2010

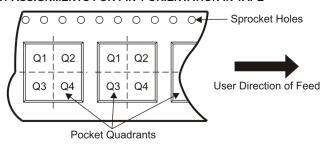
### TAPE AND REEL INFORMATION





	Dimension designed to accommodate the component width
B0	Dimension designed to accommodate the component length
K0	Dimension designed to accommodate the component thickness
W	Overall width of the carrier tape
P1	Pitch between successive cavity centers

QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



#### \*All dimensions are nominal

	7 til dillionolollo alo nominal												
	Device	Package Type	Package Drawing		SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
ı	CD4098BM96	SOIC	D	16	2500	330.0	16.4	6.5	10.3	2.1	8.0	16.0	Q1
	CD4098BPWR	TSSOP	PW	16	2000	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1

www.ti.com 30-Jul-2010



#### \*All dimensions are nominal

ĺ	Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
I	CD4098BM96	SOIC	D	16	2500	333.2	345.9	28.6
I	CD4098BPWR	TSSOP	PW	16	2000	346.0	346.0	29.0

### 14 LEADS SHOWN



- A. All linear dimensions are in inches (millimeters).
- B. This drawing is subject to change without notice.
- C. This package is hermetically sealed with a ceramic lid using glass frit.
- D. Index point is provided on cap for terminal identification only on press ceramic glass frit seal only.
- E. Falls within MIL STD 1835 GDIP1-T14, GDIP1-T16, GDIP1-T18 and GDIP1-T20.

## N (R-PDIP-T\*\*)

## PLASTIC DUAL-IN-LINE PACKAGE

16 PINS SHOWN



- A. All linear dimensions are in inches (millimeters).
- B. This drawing is subject to change without notice.
- Falls within JEDEC MS-001, except 18 and 20 pin minimum body length (Dim A).
- The 20 pin end lead shoulder width is a vendor option, either half or full width.



## D (R-PDS0-G16)

### PLASTIC SMALL OUTLINE



- A. All linear dimensions are in inches (millimeters).
- B. This drawing is subject to change without notice.
- Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.006 (0,15) each side.
- Body width does not include interlead flash. Interlead flash shall not exceed 0.017 (0,43) each side.
- E. Reference JEDEC MS-012 variation AC.



## D (R-PDSO-G16)

## PLASTIC SMALL OUTLINE



- A. All linear dimensions are in millimeters.
- B. This drawing is subject to change without notice.
- C. Publication IPC-7351 is recommended for alternate designs.
- D. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Refer to IPC-7525 for other stencil recommendations.
- E. Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.



PW (R-PDSO-G16)

### PLASTIC SMALL OUTLINE



- A. All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5M—1994.
- B. This drawing is subject to change without notice.
- Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0,15 each side.
- Body width does not include interlead flash. Interlead flash shall not exceed 0,25 each side.
- E. Falls within JEDEC MO-153



## PW (R-PDSO-G16)

## PLASTIC SMALL OUTLINE



- A. All linear dimensions are in millimeters.
- B. This drawing is subject to change without notice.
- C. Publication IPC-7351 is recommended for alternate designs.
- D. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Refer to IPC-7525 for other stencil recommendations.
- E. Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.



#### **IMPORTANT NOTICE**

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, modifications, enhancements, improvements, and other changes to its products and services at any time and to discontinue any product or service without notice. Customers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All products are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its hardware products to the specifications applicable at the time of sale in accordance with TI's standard warranty. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by government requirements, testing of all parameters of each product is not necessarily performed.

TI assumes no liability for applications assistance or customer product design. Customers are responsible for their products and applications using TI components. To minimize the risks associated with customer products and applications, customers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any TI patent right, copyright, mask work right, or other TI intellectual property right relating to any combination, machine, or process in which TI products or services are used. Information published by TI regarding third-party products or services does not constitute a license from TI to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

Reproduction of TI information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. Reproduction of this information with alteration is an unfair and deceptive business practice. TI is not responsible or liable for such altered documentation. Information of third parties may be subject to additional restrictions.

Resale of TI products or services with statements different from or beyond the parameters stated by TI for that product or service voids all express and any implied warranties for the associated TI product or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

TI products are not authorized for use in safety-critical applications (such as life support) where a failure of the TI product would reasonably be expected to cause severe personal injury or death, unless officers of the parties have executed an agreement specifically governing such use. Buyers represent that they have all necessary expertise in the safety and regulatory ramifications of their applications, and acknowledge and agree that they are solely responsible for all legal, regulatory and safety-related requirements concerning their products and any use of TI products in such safety-critical applications, notwithstanding any applications-related information or support that may be provided by TI. Further, Buyers must fully indemnify TI and its representatives against any damages arising out of the use of TI products in such safety-critical applications.

TI products are neither designed nor intended for use in military/aerospace applications or environments unless the TI products are specifically designated by TI as military-grade or "enhanced plastic." Only products designated by TI as military-grade meet military specifications. Buyers acknowledge and agree that any such use of TI products which TI has not designated as military-grade is solely at the Buyer's risk, and that they are solely responsible for compliance with all legal and regulatory requirements in connection with such use.

**Applications** 

Automotive and Transportation www.ti.com/automotive

e2e.ti.com

TI products are neither designed nor intended for use in automotive applications or environments unless the specific TI products are designated by TI as compliant with ISO/TS 16949 requirements. Buyers acknowledge and agree that, if they use any non-designated products in automotive applications, TI will not be responsible for any failure to meet such requirements.

Following are URLs where you can obtain information on other Texas Instruments products and application solutions:

		•	
Amplifiers	amplifier.ti.com	Communications and Telecom	www.ti.com/communications
Data Converters	dataconverter.ti.com	Computers and Peripherals	www.ti.com/computers
DLP® Products	www.dlp.com	Consumer Electronics	www.ti.com/consumer-apps
DSP	dsp.ti.com	Energy and Lighting	www.ti.com/energy
Clocks and Timers	www.ti.com/clocks	Industrial	www.ti.com/industrial
Interface	interface.ti.com	Medical	www.ti.com/medical
Logic	logic.ti.com	Security	www.ti.com/security
Power Mgmt	power.ti.com	Space, Avionics and Defense	www.ti.com/space-avionics-defense
Microcontrollers	microcontroller.ti.com	Video and Imaging	www.ti.com/video

RFID <u>www.ti-rfid.com</u>
OMAP Mobile Processors www.ti.com/omap

**Products** 

Audio

Wireless Connectivity www.ti.com/wirelessconnectivity

www.ti.com/audio

TI E2E Community Home Page

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265 Copyright © 2012, Texas Instruments Incorporated