

Data sheet acquired from Harris Semiconductor SCHS098D – Revised October 2003

CD40107B Types

CMOS Dual 2-Input NAND Buffer/Driver

High-Voltage Type (20-Volt Rating)

The CD40107B is a dual 2-input NAND buffer/driver containing two independent 2-input NAND buffers with open-drain single n-channel transistor outputs. This device features a wired-OR capability and high output sink current capability (136 mA typ. at $V_{DD} = 10 \text{ V}, V_{DS} = 1 \text{ V}$). The CD40107B is supplied in 8-lead hermetic dual-in-line ceramic packages (F3A suffix), 8-lead dual-in-line plastic packages (E suffix), 8-lead small-outline packages (M, M96, MT, and PSR suffixes), and 8-lead thin shrink small-outline packages (PW and PWR suffixes).

Features:

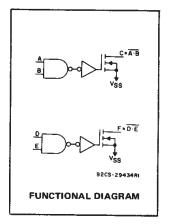
- 32 times standard B-Series output current drive sinking capability — 136 mA typ.
 VDD = 10 V, VDS = 1 V
- 100% tested for quiescent current at 20 V
- Maximum input current of 1 μA at 18 V over full package-temperature range;
 100 nA at 18 V and 25°C
- 5-V, 10-V, and 15-V parametric ratings
- Noise margin, full package temperature range, R_L to V_{DD} = 10 kΩ:

1 V at V_{DD} = 5 V

2 V at V_{DD} = 10 V

2.5 V at VDD = 15 V

Meets all requirements of JEDEC Tentative Standard No. 13B, "Standard Specifications for Description of 'B' Series CMOS Devices"



Applications

- Driving relays, lamps, LEDs
- Line driver
- Level shifter (up or down)

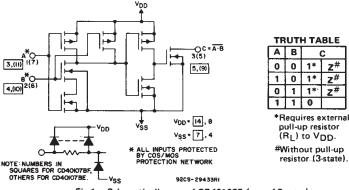


Fig.1 — Schematic diagram of CD40107B (one of 2 gates)

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

MAXIMUM RATINGS, Absolute-Maximum Values:

DC SUPPLY-VOLTAGE RANGE, (VDD)
Voltages referenced to VSS Terminal)0.5V to +20V
INPUT VOLTAGE RANGE, ALL INPUTS0.5V to VDD +0.5V
DC INPUT CURRENT, ANY ONE INPUT ±10mA
POWER DISSIPATION PER PACKAGE (PD):
For $T_A = -55^{\circ}C$ to $+100^{\circ}C$
For T _A = +100°C to +125°C Derate Linearity at 12mW/°C to 200mW
DEVICE DISSIPATION PER OUTPUT TRANSISTOR
FOR TA = FULL PACKAGE-TEMPERATURE RANGE (All Package Types) 100mW
OPERATING-TEMPERATURE RANGE (T _A)55°C to +125°C
STORAGE TEMPERATURE RANGE (T _{stg})65°C to +150°C
LEAD TEMPERATURE (DURING SOLDERING):

At distance 1/16 \pm 1/32 inch (1.59 \pm 0.79mm) from case for 10s max +265°C

RECOMMENDED OPERATING CONDITIONS

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

CHARACTERISTIC	LII	MITS.	140470
CHARACTERISTIC	MIN.	MAX.	UNITS
Supply-Voltage Range (For T _A = Full Package-Temperature Range)	3	18	٧

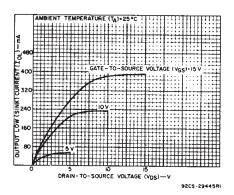


Fig.3 — Minimum output low (sink) current characteristics.

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CD40107B Types

DYNAMIC ELECTRICAL CHARACTERISTICS at TA = 25°C, CL = 50 pF, Input t_r,t_f = 20 ns

	TEST CONDIT	TIONS	LIN	IITS		
CHARACTERISTIC		V _{DD} Volts	Tues	Max.	UNITS	
			Тур.			
Propagation Delay:		5	100	200		
High-to-Low, tpHL	$R_L^* = 120 \Omega$	10	45	90	ns	
		15	30	60		
		5	100	200		
Low-to-High, tPLH	R _L * = 120 Ω	10	60	120	ns	
		15	50	100		
Transition Time:		5	50	100		
High-to-Low, t _{THL}	RL* = 120 Ω	10	20	40	ns	
mgn-to-cow, t[HL		15	10	20		
		5	50	100		
Low-to-High, tTLH	RL* = 120 Ω	10	35	70	ns	
		15	25	50	<u> </u>	
Average Input Capacitance, CIN	Any Input		5 .	7.5	ρF	
Average Output Capacitance, COUT	Any Output		30	_	pF	

^{*} R_L is external pull-up resistor to V_{DD}.

STATIC ELECTRICAL CHARACTERISTICS

CHARACTER-	CON	LIMIT	LIMITS AT INDICATED TEMPERATURES (°C)								
13110	Vo	VIN	V_{DD}	L					+25		UNITS
	(V) .	(V)	(V)	-55	-40	+85	+125	Min.	Тур.	Max.	
Quiescent Device		0,5	5	1	1	30	30		0.02	1	
Current		0,10	10	2	2	60	60	_	0.02	2	١.
IDD Max.	_	0,15	15	4	4	120	120	l. –	0.02	4	μΑ
00	_	0,20	20	20	20	600	600		0.04	20	
Output Low	0.4	0,5	5	21	20	14	12	16	32	_	
(Sink) Current	1	0,5	5	44	42	30	25	34	68	<u> </u>	[
IOL Min.	0.5	0,10	10	49	46	32	28	37	74	<u> </u>	1
10L	1	0,10	10	89	85	60	51	68	136		mA
	0.5	0,15	15	66	63	44	38	50	100	_	
Output High (Source) Current IOH Min.		No Internal Pull-Up Device									
Input Low	4.5	ŀ	5		1	.5		: -	_	1.5	
Voltage	9	_	10			3		-	_	3	
VIL Max.*	13.5	_	15		"	4		-	_	4	
Input High	0.5,4.5	_	5		3	.5		3.5	_		٧
Voltage	1,9		10			7		7	_	_	
VIH Min.*	1.5,13.5	-	15	11 11					_		
Input Current IN Max.	-	0,18	18	±0.1	±0.1	±1	±1	-	±10 ⁻⁵	±0.1	μΑ
Output Leakage Current IOZ Max.	18	0,18	18	2	2	20	20	-	10 ⁻⁴	2	μΑ

^{*} Measured with external pull-up resistor, R $_{L}$ = 10 $k\Omega$ to V $_{DD}.$

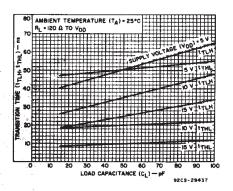


Fig.4 — Typical transition time as a function of load capacitance.

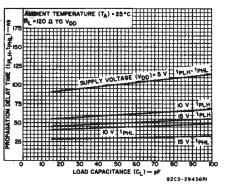


Fig.5 — Typical propagation delay time as a function of load capacitance.

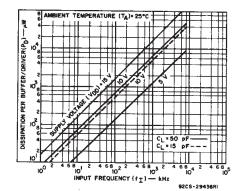


Fig.6 — Typical power dissipation as a function of input frequency.

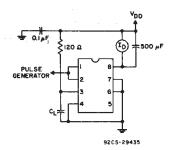
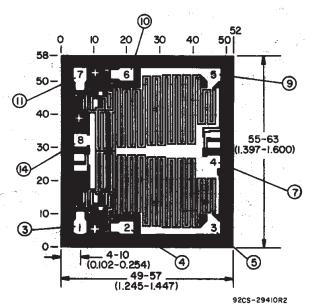


Fig. 7 — Power-dissipation test circuit for CD401078E.

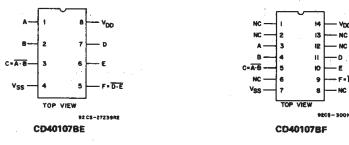
CD40107B Types



NOTE: NOS. IN PADS FOR CD40107BE NOS. OUTSIDE CHIP FOR CD40107BF

Dimensions and Pad Layout for CD40107BH.

Dimensions in parentheses are in millimeters and are derived from the basic inch dimensions as indicated. Grid graduations are in mils (10⁻³ inch).



TERMINAL ASSIGNMENTS

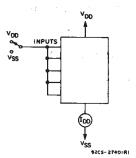


Fig.8 - Quiescent-device current test circuit.

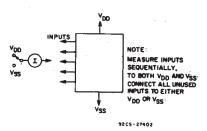


Fig. 9 – Input-current test circuit.

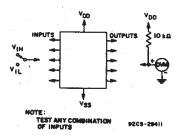


Fig. 10 - Input-voltage test circuit.

Special Considerations for CD40107B

Limiting Capacitive Currents for CL > 500 pF, V_{DD} > 15 V.
 For V_{DD} > 15 V, and load capacitance

For VDD > 15 V, and load capacitance (CL) from output to ground > 500 pF, an external 25 Ω series limiting resistor should be inserted between the output terminal and CL. No external resistor is necessary if CL < 500 pF or VDD < 15 V.

2. Driving Inductive Loads

When using the CD40107B to drive inductive loads, the load should be shunted with a diode to prevent high voltages from developing across the CD40107B output.





24-Aug-2014

PACKAGING INFORMATION

Orderable Device	Status	Package Type	Package Drawing	Pins	Package Qty	Eco Plan	Lead/Ball Finish	MSL Peak Temp	Op Temp (°C)	Device Marking (4/5)	Samples
CD40107BE	ACTIVE	PDIP	Р	8	50	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	-55 to 125	CD40107BE	Samples
CD40107BEE4	ACTIVE	PDIP	Р	8	50	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	-55 to 125	CD40107BE	Samples
CD40107BF	ACTIVE	CDIP	J	14	1	TBD	A42	N / A for Pkg Type	-55 to 125	CD40107BF	Samples
CD40107BF3A	ACTIVE	CDIP	J	14	1	TBD	A42	N / A for Pkg Type	-55 to 125	CD40107BF3A	Samples
CD40107BM	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-55 to 125	CM0107	Samples
CD40107BM96	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-55 to 125	CM0107	Samples
CD40107BME4	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-55 to 125	CM0107	Samples
CD40107BMG4	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-55 to 125	CM0107	Samples
CD40107BPSR	ACTIVE	SO	PS	8	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-55 to 125	CM0107B	Samples
CD40107BPW	ACTIVE	TSSOP	PW	8	150	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-55 to 125	CM0107B	Samples
CD40107BPWR	ACTIVE	TSSOP	PW	8	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-55 to 125	CM0107B	Samples

⁽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.

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.

⁽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.





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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.
- (4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.
- (5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.
- (6) Lead/Ball Finish Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead/Ball Finish values may wrap to two lines if the finish value exceeds the maximum column width.

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OTHER QUALIFIED VERSIONS OF CD40107B. CD40107B-MIL:

Catalog: CD40107B

Military: CD40107B-MIL

NOTE: Qualified Version Definitions:

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

PACKAGE MATERIALS INFORMATION

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TAPE AND REEL INFORMATION





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

QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*All dimensions are 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
CD40107BM96	SOIC	D	8	2500	330.0	12.4	6.4	5.2	2.1	8.0	12.0	Q1
CD40107BM96	SOIC	D	8	2500	330.0	12.4	6.4	5.2	2.1	8.0	12.0	Q1
CD40107BPSR	SO	PS	8	2000	330.0	16.4	8.2	6.6	2.5	12.0	16.0	Q1

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*All dimensions are nominal

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Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
CD40107BM96	SOIC	D	8	2500	367.0	367.0	35.0
CD40107BM96	SOIC	D	8	2500	340.5	338.1	20.6
CD40107BPSR	SO	PS	8	2000	367.0	367.0	38.0

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.

P (R-PDIP-T8)

PLASTIC DUAL-IN-LINE PACKAGE



- A. All linear dimensions are in inches (millimeters).
- B. This drawing is subject to change without notice.
- C. Falls within JEDEC MS-001 variation BA.





SMALL OUTLINE PACKAGE



- 1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.

 2. This drawing is subject to change without notice.

 3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not
- exceed 0.15 mm per side.
- 4. This dimension does not include interlead flash. Interlead flash shall not exceed 0.25 mm per side.
- 5. Reference JEDEC registration MO-153, variation AA.



SMALL OUTLINE PACKAGE



NOTES: (continued)

6. Publication IPC-7351 may have alternate designs.

7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.



SMALL OUTLINE PACKAGE



NOTES: (continued)

- 8. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
- 9. Board assembly site may have different recommendations for stencil design.



D (R-PDSO-G8)

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 AA.



D (R-PDSO-G8)

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.





NOTES: A. All linear dimensions are in millimeters.

B. This drawing is subject to change without notice.

C. Body dimensions do not include mold flash or protrusion, not to exceed 0,15.



PS (R-PDSO-G8)

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.



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