

# 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. @  $V_{DD} = 10\text{ V}$ ,  $V_{DS} = 1\text{ V}$
- 100% tested for quiescent current at 20 V
- Maximum input current of  $1\text{ }\mu\text{A}$  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  $V_{DD} = 10\text{ k}\Omega$ :  
1 V at  $V_{DD} = 5\text{ V}$   
2 V at  $V_{DD} = 10\text{ V}$   
2.5 V at  $V_{DD} = 15\text{ V}$
- Meets all requirements of JEDEC Tentative Standard No. 13B, "Standard Specifications for Description of 'B' Series CMOS Devices"

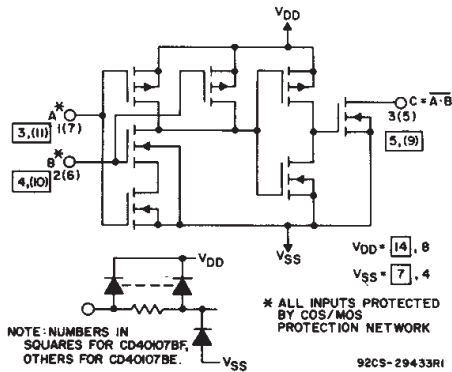
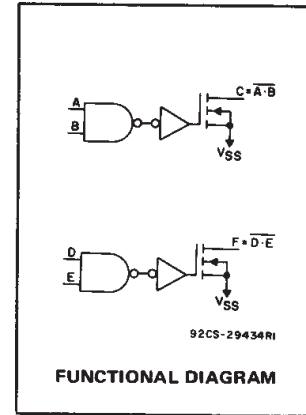


Fig.1 – Schematic diagram of CD40107B (one of 2 gates)

**TRUTH TABLE**

A	B	C
0	0	1*
0	1	1*
1	0	1*
1	1	0

\*Requires external pull-up resistor ( $R_L$ ) to  $V_{DD}$ .  
#Without pull-up resistor. (3-state).

### Applications

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

### MAXIMUM RATINGS, Absolute-Maximum Values:

DC SUPPLY-VOLTAGE RANGE, ( $V_{DD}$ )	-0.5V to +20V
Voltages referenced to $V_{SS}$ Terminal	
INPUT VOLTAGE RANGE, ALL INPUTS	-0.5V to $V_{DD} + 0.5\text{ V}$
DC INPUT CURRENT, ANY ONE INPUT	$\pm 10\text{ mA}$
POWER DISSIPATION PER PACKAGE ( $P_D$ ):	
For $T_A = -55^\circ\text{C}$ to $+100^\circ\text{C}$	500mW
For $T_A = +100^\circ\text{C}$ to $+125^\circ\text{C}$	Derate Linearly at 12mW/°C to 200mW
DEVICE DISSIPATION PER OUTPUT TRANSISTOR	
FOR $T_A = \text{FULL PACKAGE-TEMPERATURE RANGE (All Package Types)}$	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 ± 1/32 inch (1.59 ± 0.79mm) from case for 10s max	+265°C

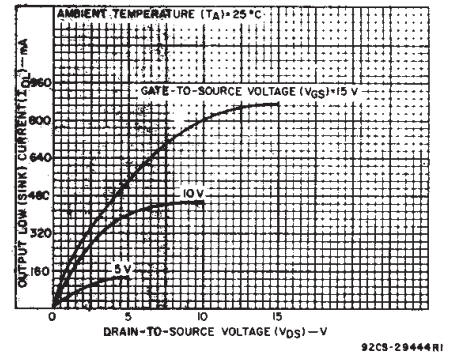


Fig.2 – Typical output low (sink) current characteristics.

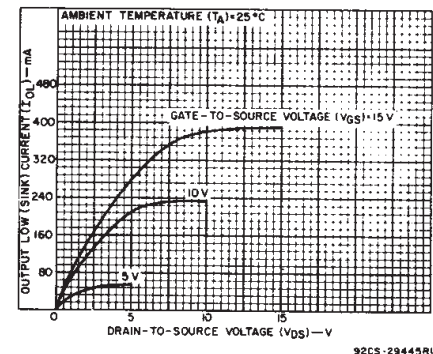


Fig.3 – Minimum output low (sink) current characteristics.

### RECOMMENDED OPERATING CONDITIONS

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

CHARACTERISTIC	LIMITS		UNITS
	MIN.	MAX.	
Supply-Voltage Range (For $T_A = \text{Full Package-Temperature Range}$ )	3	18	V

# CD40107B Types

DYNAMIC ELECTRICAL CHARACTERISTICS at  $T_A = 25^\circ\text{C}$ ,  $C_L = 50\text{ pF}$ , Input  $t_r, t_f = 20\text{ ns}$

CHARACTERISTIC	TEST CONDITIONS	LIMITS			UNITS
		VDD Volts	Typ.	Max.	
Propagation Delay: High-to-Low, $t_{PHL}$	$R_L^* = 120\ \Omega$	5	100	200	ns
		10	45	90	
		15	30	60	
Low-to-High, $t_{PLH}$	$R_L^* = 120\ \Omega$	5	100	200	ns
		10	60	120	
		15	50	100	
Transition Time: High-to-Low, $t_{THL}$	$R_L^* = 120\ \Omega$	5	50	100	ns
		10	20	40	
		15	10	20	
Low-to-High, $t_{TLH}$	$R_L^* = 120\ \Omega$	5	50	100	ns
		10	35	70	
		15	25	50	
Average Input Capacitance, $C_{IN}$	Any Input		5	7.5	pF
Average Output Capacitance, $C_{OUT}$	Any Output		30	—	pF

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

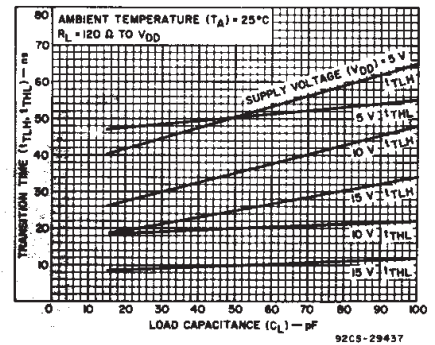


Fig. 4 — Typical transition time as a function of load capacitance.

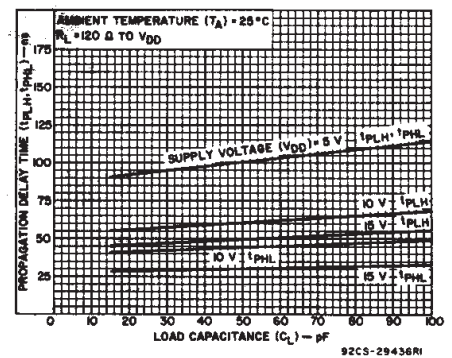


Fig. 5 — Typical propagation delay time as a function of load capacitance.

## STATIC ELECTRICAL CHARACTERISTICS

CHARACTERISTIC	CONDITIONS			LIMITS AT INDICATED TEMPERATURES ( $^\circ\text{C}$ )							UNITS
	$V_O$ (V)	$V_{IN}$ (V)	$V_{DD}$ (V)	+25							
				-55	-40	+85	+125	Min.	Typ.	Max.	
Quiescent Device Current $I_{DD}$ Max.	—	0,5	5	1	1	30	30	—	0.02	1	$\mu\text{A}$
	—	0,10	10	2	2	60	60	—	0.02	2	
	—	0,15	15	4	4	120	120	—	0.02	4	
	—	0,20	20	20	20	600	600	—	0.04	20	
Output Low (Sink) Current $I_{OL}$ Min.	0.4	0,5	5	21	20	14	12	16	32	—	mA
	1	0,5	5	44	42	30	25	34	68	—	
	0.5	0,10	10	49	46	32	28	37	74	—	
	1	0,10	10	89	85	60	51	68	136	—	
Output High (Source) Current $I_{OH}$ Min.	No Internal Pull-Up Device										
Input Low Voltage $V_{IL}$ Max.*	4.5	—	5	1.5				—	—	1.5	V
	9	—	10	3				—	—	3	
	13.5	—	15	4				—	—	4	
Input High Voltage $V_{IH}$ Min.*	0.5, 4.5	—	5	3.5				3.5	—	—	V
	1.9	—	10	7				7	—	—	
	1.5, 13.5	—	15	11				11	—	—	
Input Current $I_{IN}$ Max.	—	0,18	18	$\pm 0.1$	$\pm 0.1$	$\pm 1$	$\pm 1$	—	$\pm 10^{-5}$	$\pm 0.1$	$\mu\text{A}$
Output Leakage Current $I_{OZ}$ Max.	18	0,18	18	2	2	20	20	—	$10^{-4}$	2	$\mu\text{A}$

\* Measured with external pull-up resistor,  $R_L = 10\text{ k}\Omega$  to  $V_{DD}$ .

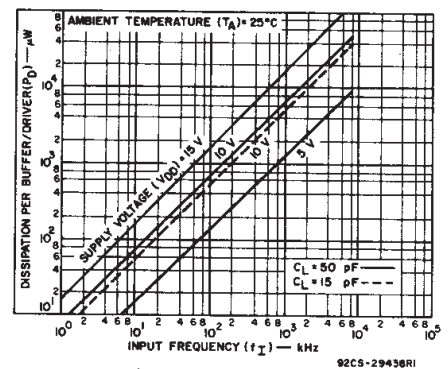


Fig. 6 — Typical power dissipation as a function of input frequency.

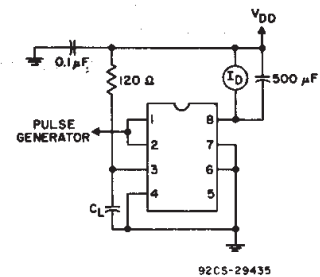
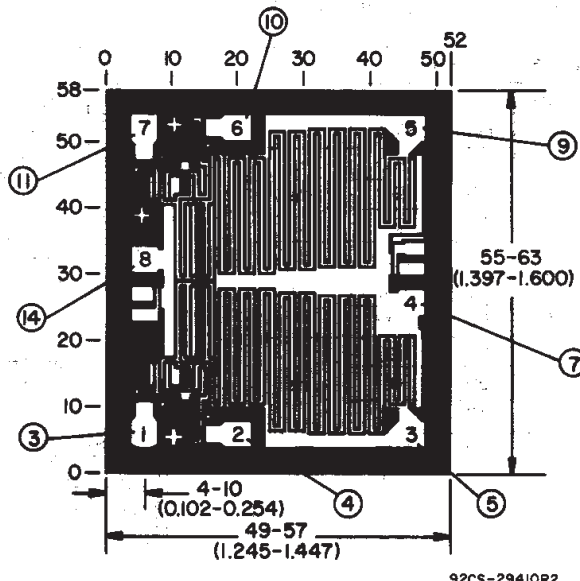


Fig. 7 — Power-dissipation test circuit for CD40107BE.

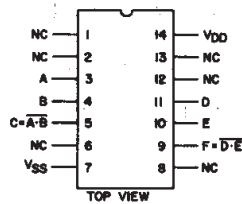
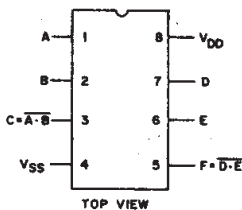
3  
COMMERCIAL CMOS  
HIGH VOLTAGE ICs

# CD40107B Types



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

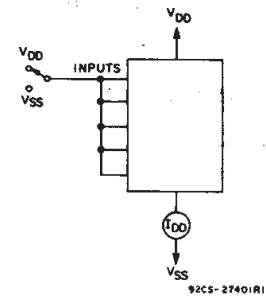


Fig.8 - Quiescent-device current test circuit.

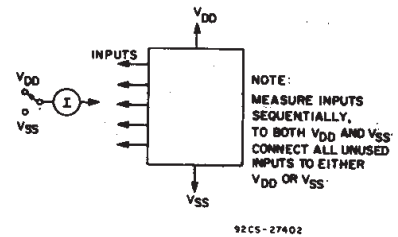


Fig.9 - Input-current test circuit.

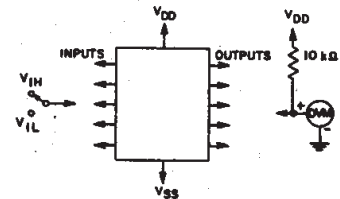


Fig.10 - Input-voltage test circuit.

## Special Considerations for CD40107B

1. Limiting Capacitive Currents for  $C_L > 500$  pF,  $V_{DD} > 15$  V.

For  $V_{DD} > 15$  V, and load capacitance ( $C_L$ ) from output to ground  $> 500$  pF, an external  $25 \Omega$  series limiting resistor should be inserted between the output terminal and  $C_L$ . No external resistor is necessary if  $C_L < 500$  pF or  $V_{DD} < 15$  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.

**PACKAGING INFORMATION**

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish	MSL Peak Temp (3)	Op Temp (°C)	Top-Side Markings (4)	Samples
CD40107BE	ACTIVE	PDIP	P	8	50	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	-55 to 125	CD40107BE	<a href="#">Samples</a>
CD40107BEE4	ACTIVE	PDIP	P	8	50	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	-55 to 125	CD40107BE	<a href="#">Samples</a>
CD40107BF	ACTIVE	CDIP	J	14	1	TBD	A42	N / A for Pkg Type	-55 to 125	CD40107BF	<a href="#">Samples</a>
CD40107BF3A	ACTIVE	CDIP	J	14	1	TBD	A42	N / A for Pkg Type	-55 to 125	CD40107BF3A	<a href="#">Samples</a>
CD40107BM	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-55 to 125	CM0107	<a href="#">Samples</a>
CD40107BM96	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-55 to 125	CM0107	<a href="#">Samples</a>
CD40107BM96E4	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-55 to 125	CM0107	<a href="#">Samples</a>
CD40107BM96G4	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-55 to 125	CM0107	<a href="#">Samples</a>
CD40107BME4	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-55 to 125	CM0107	<a href="#">Samples</a>
CD40107BMG4	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-55 to 125	CM0107	<a href="#">Samples</a>
CD40107BMT	ACTIVE	SOIC	D	8	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-55 to 125	CM0107	<a href="#">Samples</a>
CD40107BMTE4	ACTIVE	SOIC	D	8	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-55 to 125	CM0107	<a href="#">Samples</a>
CD40107BMTG4	ACTIVE	SOIC	D	8	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-55 to 125	CM0107	<a href="#">Samples</a>
CD40107BPSR	ACTIVE	SO	PS	8	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-55 to 125	CM0107B	<a href="#">Samples</a>
CD40107BPSRE4	ACTIVE	SO	PS	8	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-55 to 125	CM0107B	<a href="#">Samples</a>
CD40107BPSRG4	ACTIVE	SO	PS	8	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-55 to 125	CM0107B	<a href="#">Samples</a>
CD40107BPW	ACTIVE	TSSOP	PW	8	150	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-55 to 125	CM0107B	<a href="#">Samples</a>

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish	MSL Peak Temp (3)	Op Temp (°C)	Top-Side Markings (4)	Samples
CD40107BPWE4	ACTIVE	TSSOP	PW	8	150	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-55 to 125	CM0107B	<a href="#">Samples</a>
CD40107BPWG4	ACTIVE	TSSOP	PW	8	150	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-55 to 125	CM0107B	<a href="#">Samples</a>
CD40107BPWR	ACTIVE	TSSOP	PW	8	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-55 to 125	CM0107B	<a href="#">Samples</a>
CD40107BPWRE4	ACTIVE	TSSOP	PW	8	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-55 to 125	CM0107B	<a href="#">Samples</a>
CD40107BPWRG4	ACTIVE	TSSOP	PW	8	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-55 to 125	CM0107B	<a href="#">Samples</a>

(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.

(4) Multiple Top-Side Markings will be inside parentheses. Only one Top-Side 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 Top-Side Marking for that device.

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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

## TAPE AND REEL INFORMATION



### QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	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
CD40107BMT	SOIC	D	8	250	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
CD40107BPWR	TSSOP	PW	8	2000	330.0	12.4	7.0	3.6	1.6	8.0	12.0	Q1

## TAPE AND REEL BOX DIMENSIONS



\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
CD40107BM96	SOIC	D	8	2500	340.5	338.1	20.6
CD40107BM96	SOIC	D	8	2500	367.0	367.0	35.0
CD40107BMT	SOIC	D	8	250	340.5	338.1	20.6
CD40107BPSR	SO	PS	8	2000	367.0	367.0	38.0
CD40107BPWR	TSSOP	PW	8	2000	367.0	367.0	35.0



J (R-GDIP-T\*\*)

14 LEADS SHOWN

CERAMIC DUAL IN-LINE PACKAGE



DIM \ PINS **	14	16	18	20
A	0.300 (7,62) BSC	0.300 (7,62) BSC	0.300 (7,62) BSC	0.300 (7,62) BSC
B MAX	0.785 (19,94)	.840 (21,34)	0.960 (24,38)	1.060 (26,92)
B MIN	—	—	—	—
C MAX	0.300 (7,62)	0.300 (7,62)	0.310 (7,87)	0.300 (7,62)
C MIN	0.245 (6,22)	0.245 (6,22)	0.220 (5,59)	0.245 (6,22)



4040083/F 03/03

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

P (R-PDIP-T8)

PLASTIC DUAL-IN-LINE PACKAGE



- NOTES:
- 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.

D (R-PDSO-G8)

PLASTIC SMALL OUTLINE



- NOTES:
- A. All linear dimensions are in inches (millimeters).
  - B. This drawing is subject to change without notice.
  - $\triangle C$  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.
  - $\triangle D$  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



- NOTES:
- 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.

## MECHANICAL DATA

PS (R-PDSO-G8)

PLASTIC SMALL-OUTLINE PACKAGE



- 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)

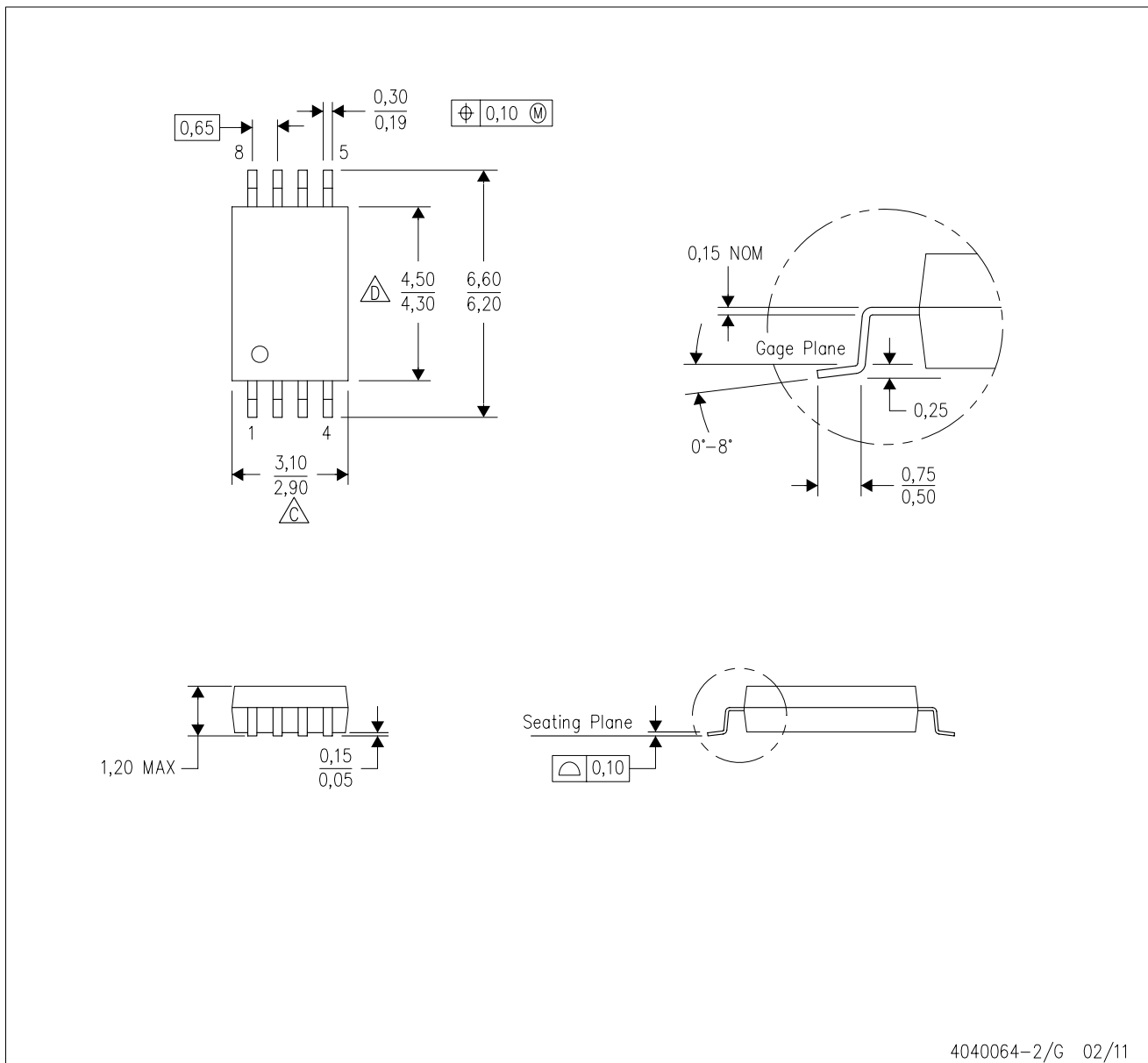
PLASTIC SMALL OUTLINE



- NOTES:
- All linear dimensions are in millimeters.
  - This drawing is subject to change without notice.
  - Publication IPC-7351 is recommended for alternate designs.
  - 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.
  - Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.

PW (R-PDSO-G8)

PLASTIC SMALL OUTLINE



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

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