

# 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"

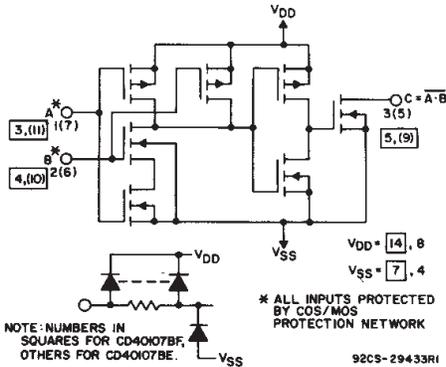
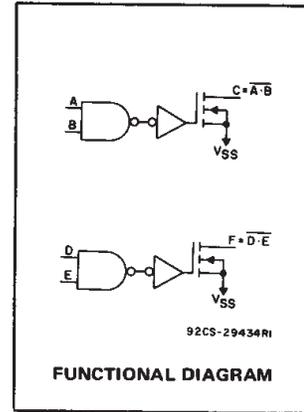


Fig.1 – Schematic diagram of CD40107B (one of 2 gates)

**TRUTH TABLE**

A	B	C
0	0	1*
1	0	1*
0	1	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 $12\text{ mW}/^\circ\text{C}$ to 200mW
DEVICE DISSIPATION PER OUTPUT TRANSISTOR		
FOR $T_A = \text{FULL PACKAGE-TEMPERATURE RANGE (All Package Types)}$	.....	100mW
OPERATING-TEMPERATURE RANGE ( $T_A$ )	.....	$-55^\circ\text{C}$ to $+125^\circ\text{C}$
STORAGE TEMPERATURE RANGE ( $T_{stg}$ )	.....	$-65^\circ\text{C}$ to $+150^\circ\text{C}$
LEAD TEMPERATURE (DURING SOLDERING):		
At distance $1/16 \pm 1/32$ inch ( $1.59 \pm 0.79\text{ mm}$ ) from case for 10s max	.....	$+265^\circ\text{C}$

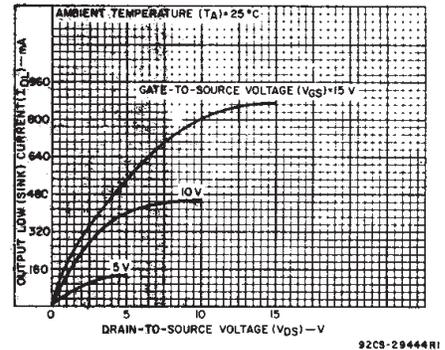


Fig.2 – Typical output low (sink) current characteristics.

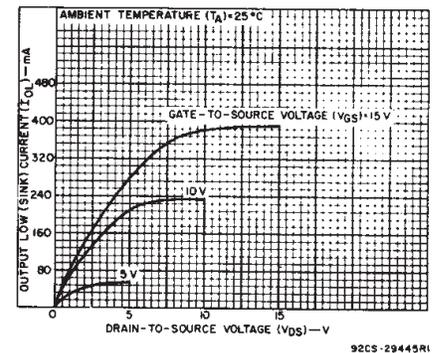


Fig.3 – Minimum output low (sink) current characteristics.

### 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  $V_{DD}$ .

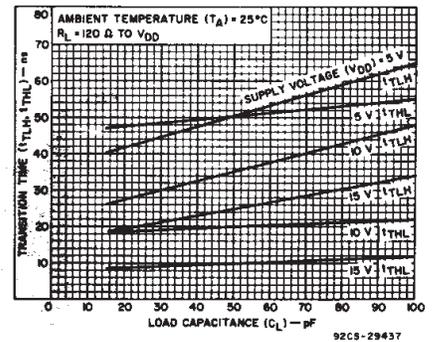


Fig. 4 — Typical transition time as a function of load capacitance.

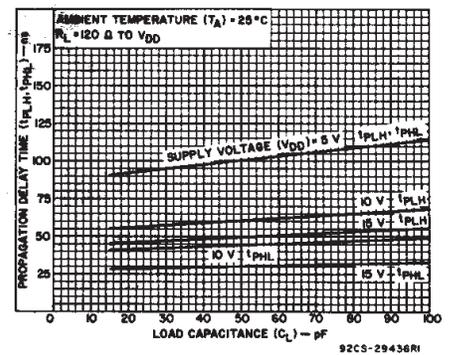


Fig. 5 — Typical propagation delay time as a function of load capacitance.

## 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  $V_{DD}$ .

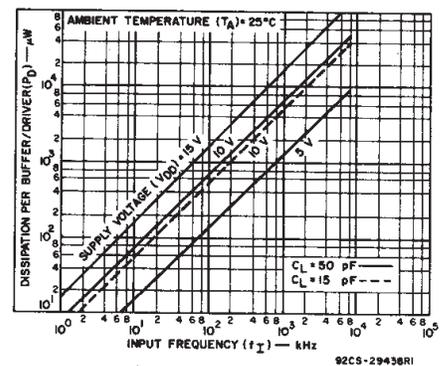


Fig. 6 — Typical power dissipation as a function of input frequency.

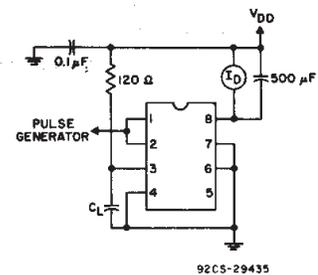
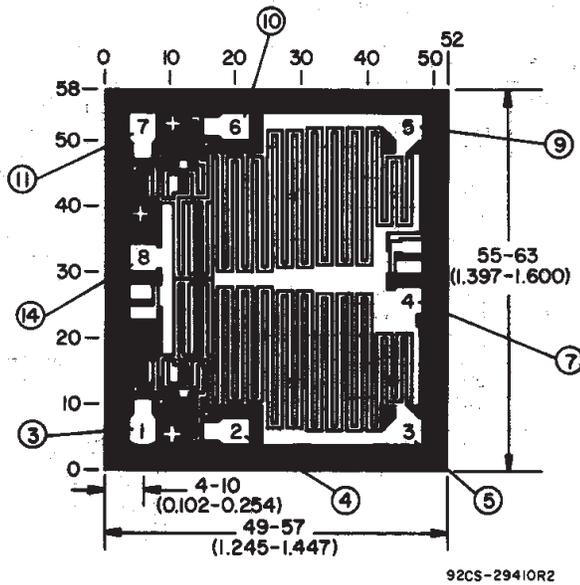


Fig. 7 — Power-dissipation test circuit for CD40107BE.

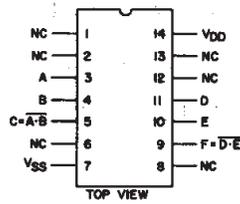
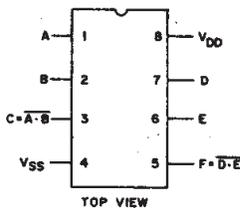
3  
COMMERCIAL CMOS  
HIGH VOLTAGE ICs

# 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

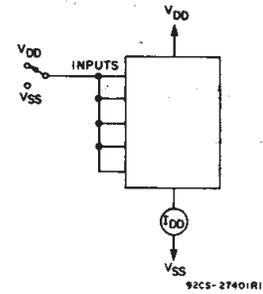


Fig. 8 - Quiescent-device current test circuit.

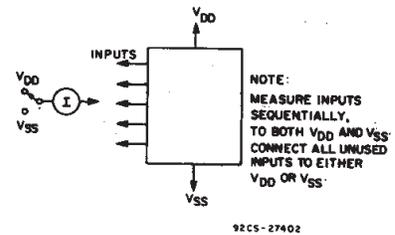
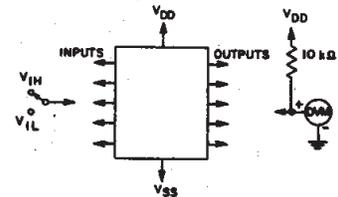


Fig. 9 - Input-current test circuit.



NOTE: TEST ANY COMBINATION OF INPUTS

Fig. 10 - Input-voltage test circuit.

## Special Considerations for CD40107B

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

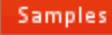
For  $V_{DD} > 15$  V, and load capacitance ( $C_L$ ) from output to ground  $> 500$  pF, an external  $25 \Omega$  series limiting resistor should be inserted between the output terminal and  $C_L$ . No external resistor is necessary if  $C_L < 500$  pF or  $V_{DD} < 15$  V.

### 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	
CD40107BPWG4	ACTIVE	TSSOP	PW	8	150	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-55 to 125	CM0107B	
CD40107BPWR	ACTIVE	TSSOP	PW	8	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-55 to 125	CM0107B	
CD40107BPWRE4	ACTIVE	TSSOP	PW	8	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-55 to 125	CM0107B	
CD40107BPWRG4	ACTIVE	TSSOP	PW	8	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-55 to 125	CM0107B	

(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) Only one of markings shown within the brackets will appear on the physical device.

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**OTHER QUALIFIED VERSIONS OF CD40107B, CD40107B-MIL :**

- Catalog: [CD40107B](#)
- Military: [CD40107B-MIL](#)

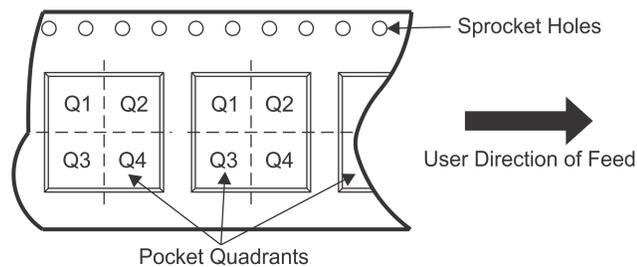
NOTE: Qualified Version Definitions:

- 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**

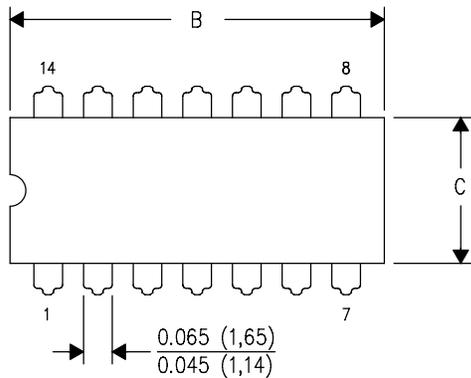

\*All dimensions are nominal

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)

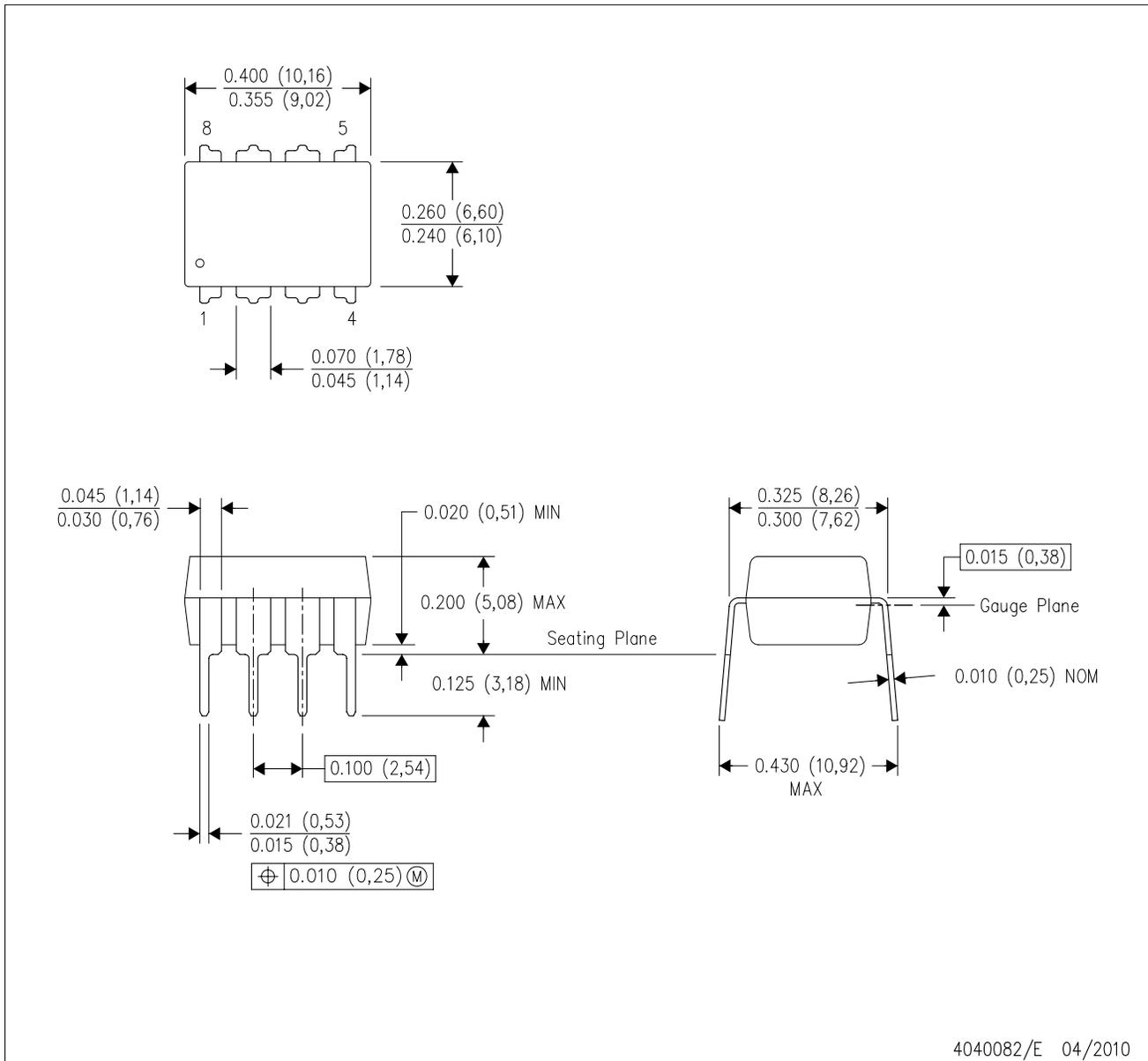


4040083/F 03/03

- 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

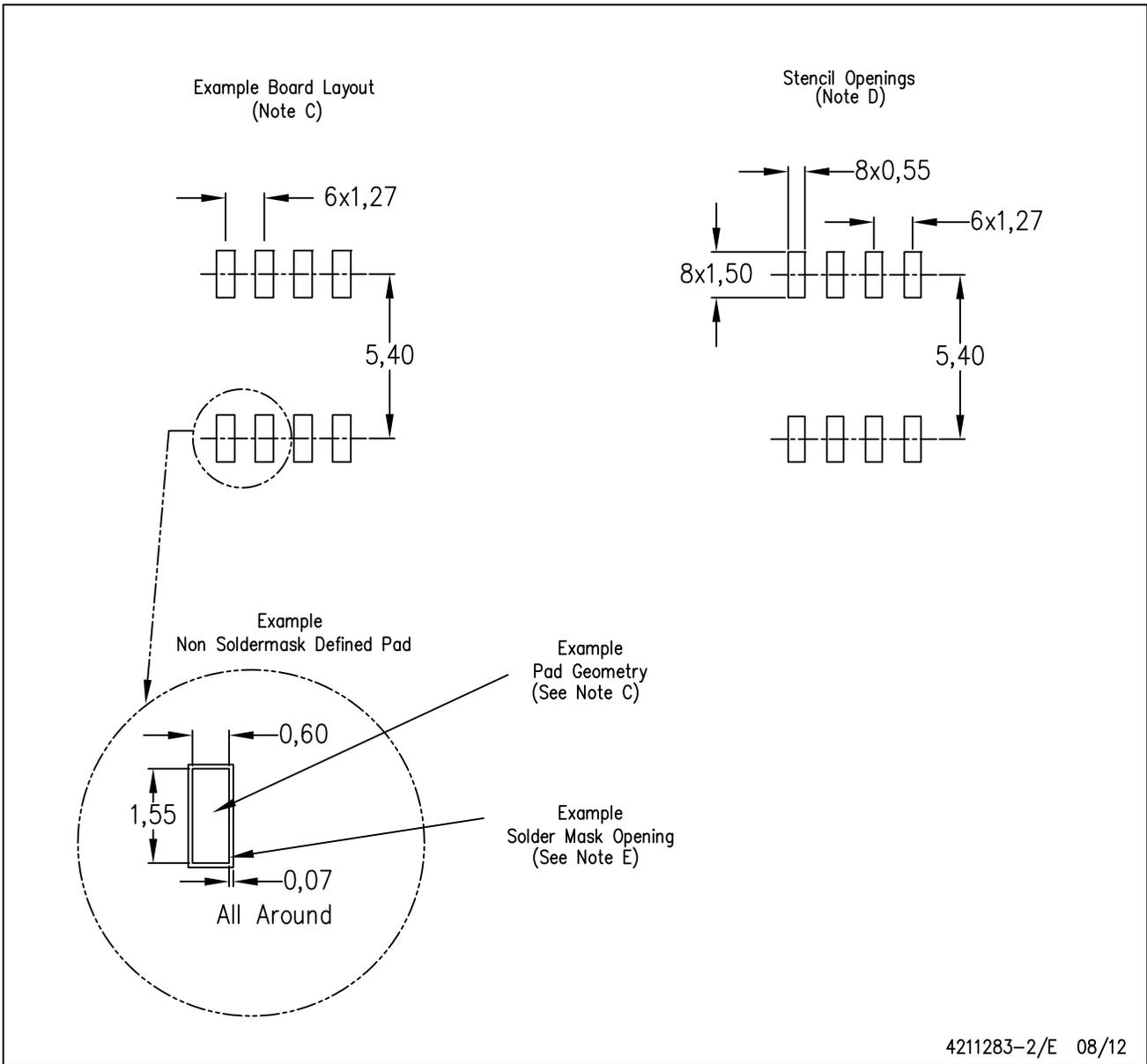


- NOTES:
- A. All linear dimensions are in inches (millimeters).
  - B. This drawing is subject to change without notice.
  - C. Falls within JEDEC MS-001 variation BA.



D (R-PDSO-G8)

PLASTIC SMALL OUTLINE

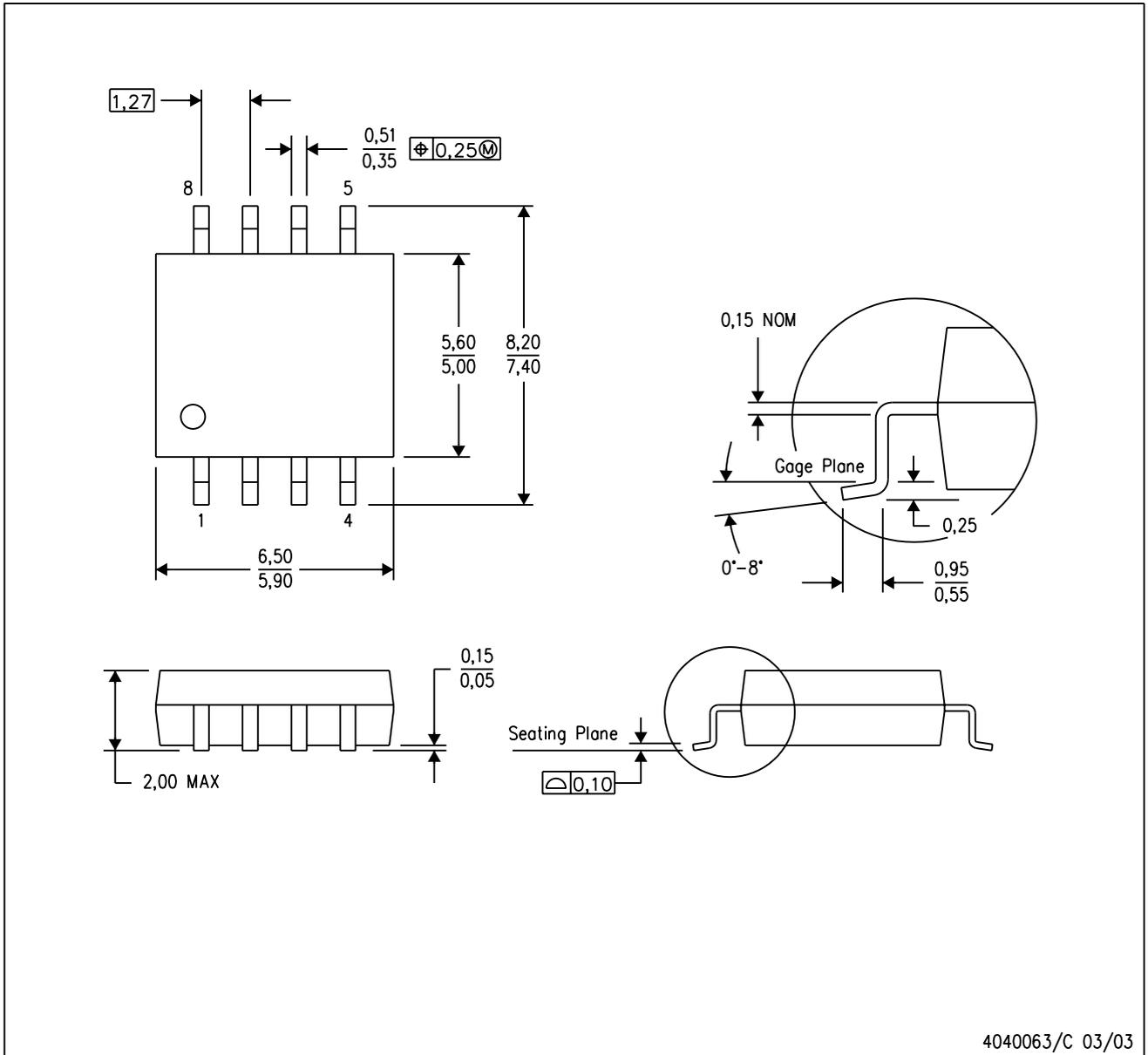


- NOTES:
- A. All linear dimensions are in millimeters.
  - B. This drawing is subject to change without notice.
  - C. Publication IPC-7351 is recommended for alternate designs.
  - D. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers 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)

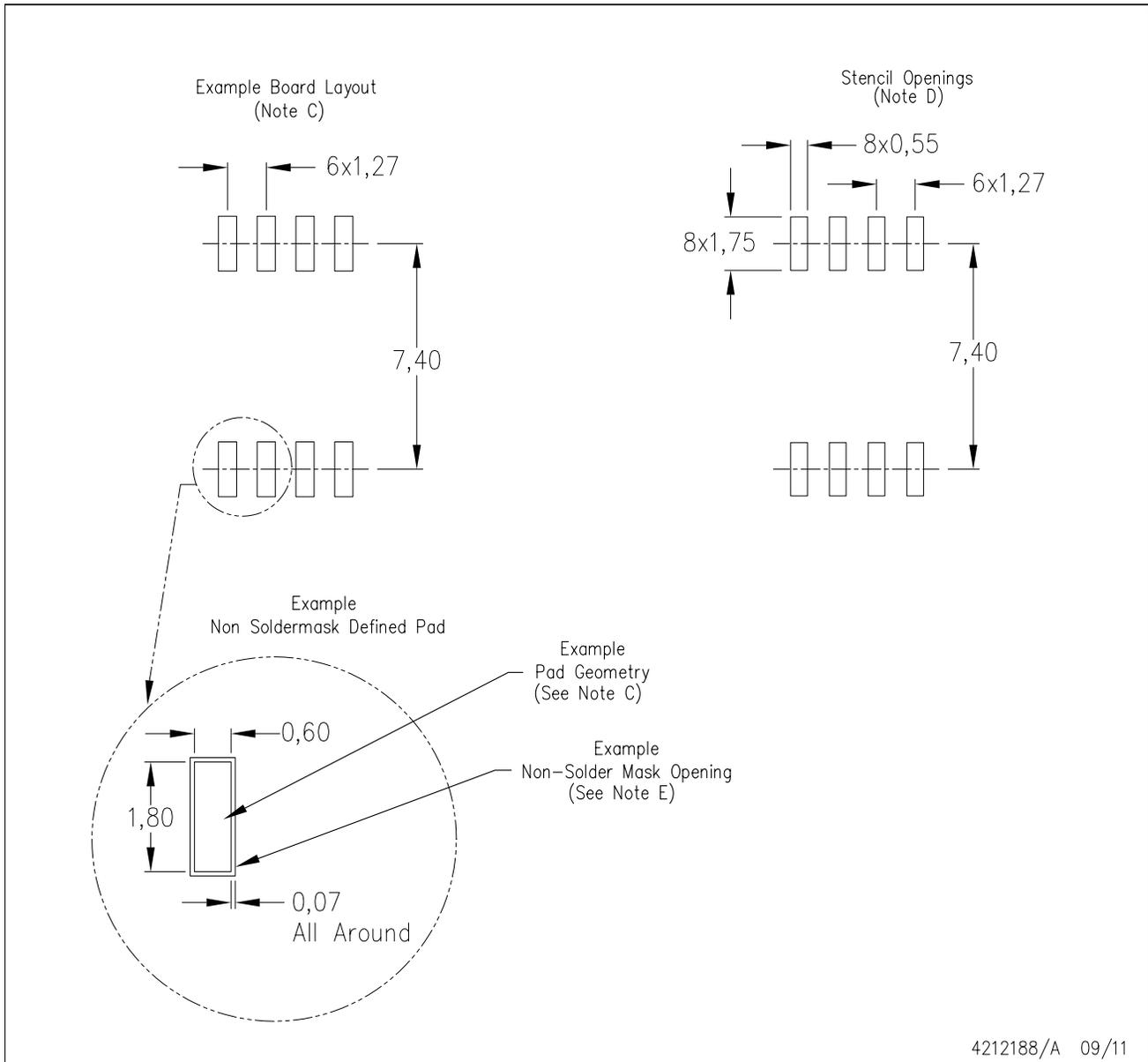
PLASTIC SMALL-OUTLINE PACKAGE



- 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)

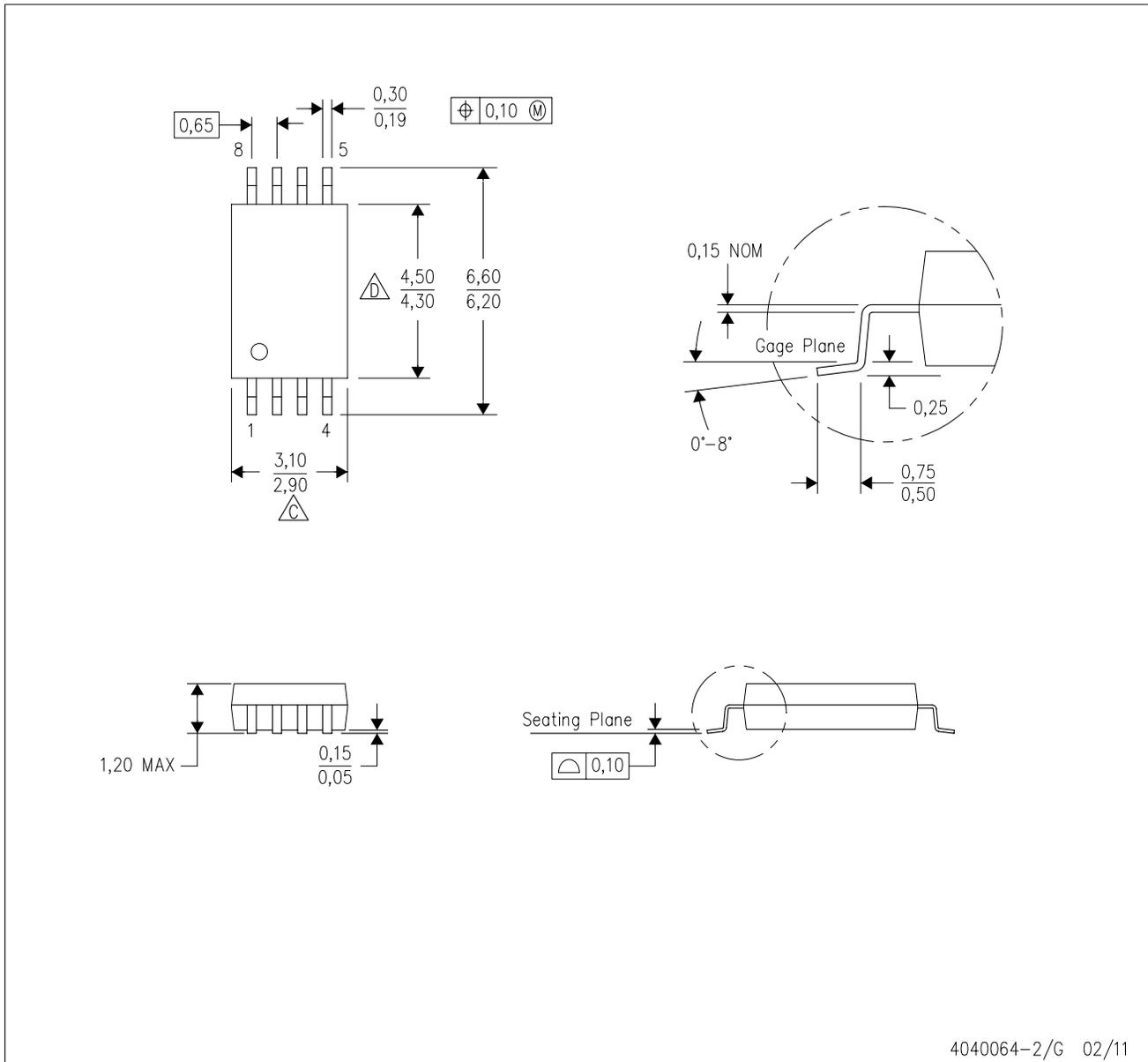
PLASTIC SMALL OUTLINE



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- A. All linear dimensions are in millimeters.
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  - E. 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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