

# CD40257B Types

## CMOS Quad 2-Line-to-1-Line Data Selector/Multiplexer

High-Voltage Types (20-Volt Rating)

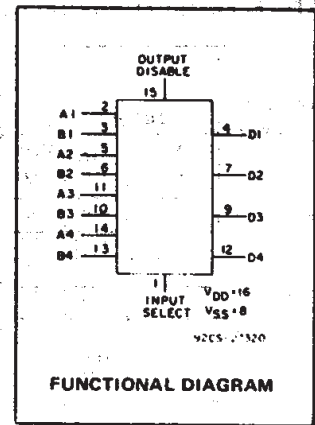
■ CD40257B is a Data Selector/Multiplexer featuring three-state outputs which can interface directly with and drive data lines of bus-oriented systems. The CD40257B types are supplied in 16-lead hermetic dual-in-line ceramic packages (F3A suffix), 16-lead dual-in-line plastic packages (E suffix), 16-lead small-outline packages (M, M96, MT, and NSR suffixes), and 16-lead thin shrink small-outline packages (PW and PWR suffixes).

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

DC SUPPLY-VOLTAGE RANGE, (V <sub>DD</sub> )	
Voltages referenced to V <sub>SS</sub> Terminal	-0.5V to +20V
INPUT VOLTAGE RANGE, ALL INPUTS	-0.5V to V <sub>DD</sub> +0.5V
DC INPUT CURRENT, ANY ONE INPUT	±10mA
POWER DISSIPATION PER PACKAGE (P <sub>D</sub> ):	
For T <sub>A</sub> = -55°C to +100°C	500mW
For T <sub>A</sub> = +100°C to +125°C	Derate Linearly at 12mW/°C to 200mW
DEVICE DISSIPATION PER OUTPUT TRANSISTOR	
FOR T <sub>A</sub> = FULL PACKAGE-TEMPERATURE RANGE (All Package Types)	100mW
OPERATING-TEMPERATURE RANGE (T <sub>A</sub> )	-55°C to +125°C
STORAGE TEMPERATURE RANGE (T <sub>stg</sub> )	-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

**Features:**

- 3-state outputs
- Standardized, symmetrical output characteristics
- 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
- Noise margin (over 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
- Meets all requirements of JEDEC Tentative Standard No. 13A, "Standard Specifications for Description of 'B' Series CMOS Devices"



**Applications:**

- Digital Multiplexing
- Shift-right/shift-left registers
- True/complement selection

**RECOMMENDED OPERATING CONDITION**

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 <sub>A</sub> =Full Package-Temperature Range)	3	18	V

**TRUTH TABLE**

3-STATE OUTPUT DISABLE	INPUTS		OUTPUT
	SELECT	A B	
1	X	X X	Z
0	0	0 X	0
0	0	1 X	1
0	1	X 0	0
0	1	X 1	1

X = DON'T CARE LOGIC 1 = HIGH  
LOGIC 0 = LOW Z = HIGH IMPEDANCE

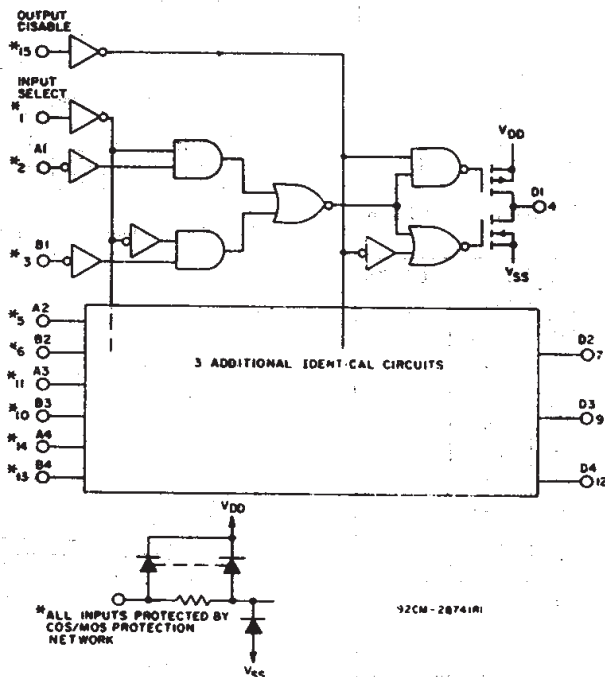


Fig. 1 - Logic diagram for CD40257B.

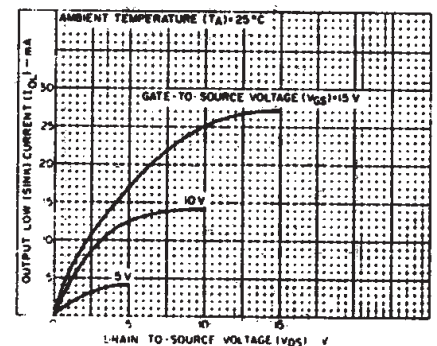


Fig. 2 - Typical output low (sink) current characteristics.

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## STATIC ELECTRICAL CHARACTERISTICS

CHARACTERISTIC	CONDITIONS			LIMITS AT INDICATED TEMPERATURES (°C)							UNITS
	V <sub>O</sub> (V)	V <sub>IN</sub> (V)	V <sub>DD</sub> (V)	-55	-40	+85	+125	+25			
								Min.	Typ.	Max.	
Quiescent Device Current I <sub>DD</sub> Max.	-	0.5	5	1	1	30	30	-	0.02	1	μA
	-	0.10	10	2	2	60	60	-	0.02	2	
	-	0.15	15	4	4	120	120	-	0.02	4	
Output Low (Sink) Current, I <sub>OL</sub> Min.	0.4	0.5	5	0.64	0.61	0.42	0.36	0.51	1	-	mA
	0.5	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	-	
Output High (Source) Current, I <sub>OH</sub> Min.	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	-	
	9.5	0.10	10	-1.6	-1.5	-1.1	-0.9	-1.3	-2.6	-	
Output Voltage: Low-Level, V <sub>OL</sub> Max.	-	0.5	5			0.05			0	0.05	V
	-	0.10	10			0.05			0	0.05	
	-	0.15	15			0.05			0	0.05	
Output Voltage: High-Level, V <sub>OH</sub> Min.	-	0.5	5			4.95		4.95	5	-	V
	-	0.10	10			9.95		9.95	10	-	
	-	0.15	15			14.95		14.95	15	-	
Input Low Voltage, V <sub>IL</sub> Max.	0.5, 4.5	-	5			1.5		-	-	1.5	V
	1.9	-	10			3		-	-	3	
	1.5, 13.5	-	15			4		-	-	4	
Input High Voltage, V <sub>IH</sub> 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 <sub>IN</sub> Max.	-	0.18	18	±0.1	±0.1	±1	±1	-	±10 <sup>-5</sup>	±0.1	μA
3-State Output Leakage Current I <sub>OUT</sub> Max.		0.18	18	±0.4	±0.4	±12	±12	-	±10 <sup>-4</sup>	±0.4	μA

**DYNAMIC ELECTRICAL CHARACTERISTICS at T<sub>A</sub> = 25°C; Input t<sub>r</sub>, t<sub>f</sub> = 20 ns, C<sub>L</sub> = 50 pF, R<sub>L</sub> = 200 KΩ**

CHARACTERISTIC	TEST CONDITIONS	LIMITS		UNITS	
		V <sub>DD</sub> (V)	Typ.		Max.
Propagation Delay Time: Data Input to Output, t <sub>PHL</sub> , t <sub>PLH</sub>		5	150	300	ns
		10	70	140	
		15	50	100	
Select to Output, t <sub>PHL</sub> , t <sub>PLH</sub>		5	190	380	ns
		10	85	170	
		15	65	130	
Output Disable to Output, t <sub>PHL</sub> , t <sub>PLH</sub>		5	95	190	ns
		10	50	100	
		15	40	80	
Transition Time, t <sub>THL</sub> , t <sub>TLH</sub>		5	100	200	ns
		10	50	100	
		15	40	80	
Input Capacitance, C <sub>IN</sub>	Any Input	-	5	7.5	pF

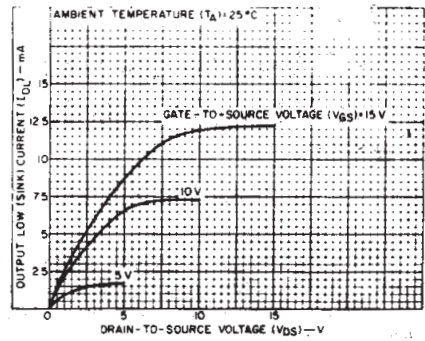


Fig.3 - Minimum output low (sink) current characteristics.

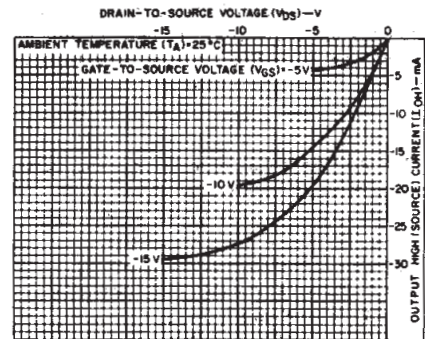


Fig.4 - Typical output high (source) current characteristics.

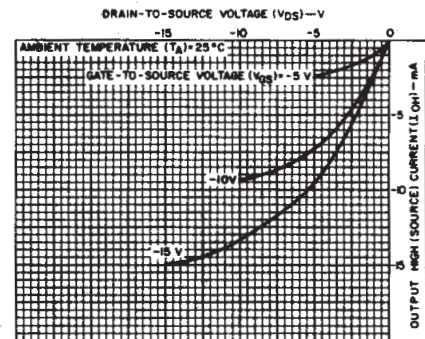


Fig.5 - Minimum output high (source) current characteristics.

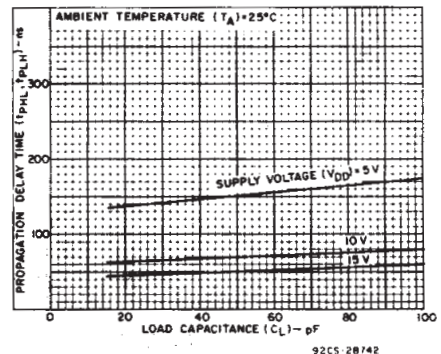


Fig.6 - Typical propagation delay time as a function of load capacitance (DATA INPUT to OUTPUT).

# CD40257B Types

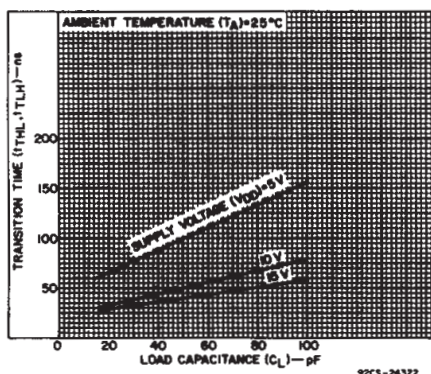


Fig.7 - Typical transition time as a function of load capacitance.

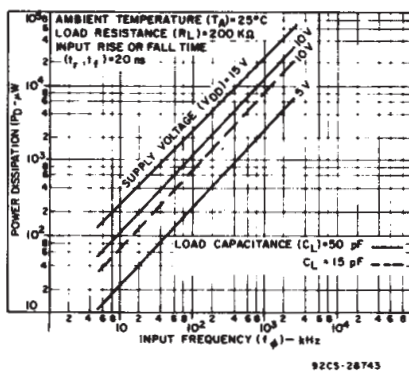


Fig.8 - Typical dynamic power dissipation as a function of input frequency (one INPUT to one OUTPUT).

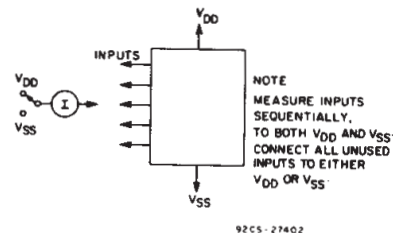


Fig.9 - Input current test circuit.

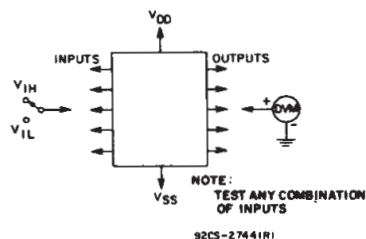


Fig.10 - Input voltage test circuit.

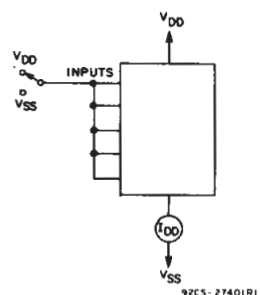
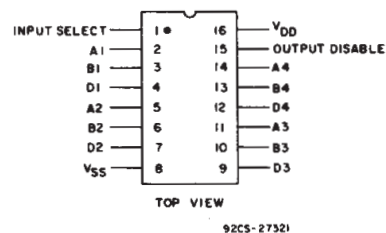
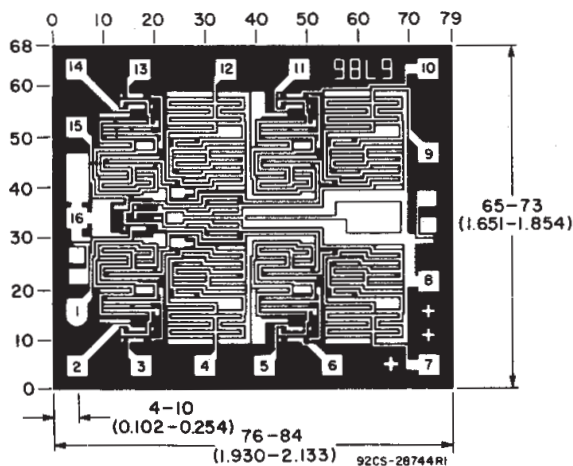


Fig.11 - Quiescent device current test circuit.



TERMINAL ASSIGNMENT

Dimensions and pad layout for CD40257BH.



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).

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**PACKAGING INFORMATION**

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)
CD40257BE	ACTIVE	PDIP	N	16	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	Contact TI Distributor or Sales Office
CD40257BEE4	ACTIVE	PDIP	N	16	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	Contact TI Distributor or Sales Office
CD40257BF3A	ACTIVE	CDIP	J	16	1	TBD	A42	N / A for Pkg Type	<a href="#">Purchase Samples</a>
CD40257BM	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	<a href="#">Purchase Samples</a>
CD40257BME4	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	<a href="#">Purchase Samples</a>
CD40257BMG4	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	<a href="#">Purchase Samples</a>
CD40257BMT	ACTIVE	SOIC	D	16	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	<a href="#">Purchase Samples</a>
CD40257BMTE4	ACTIVE	SOIC	D	16	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	<a href="#">Purchase Samples</a>
CD40257BMTG4	ACTIVE	SOIC	D	16	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	<a href="#">Purchase Samples</a>

<sup>(1)</sup> 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.

<sup>(2)</sup> 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)

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

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**OTHER QUALIFIED VERSIONS OF CD40257B, CD40257B-MIL :**

- Catalog: [CD40257B](#)
- Military: [CD40257B-MIL](#)

NOTE: Qualified Version Definitions:

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

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.

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

PLASTIC DUAL-IN-LINE PACKAGE

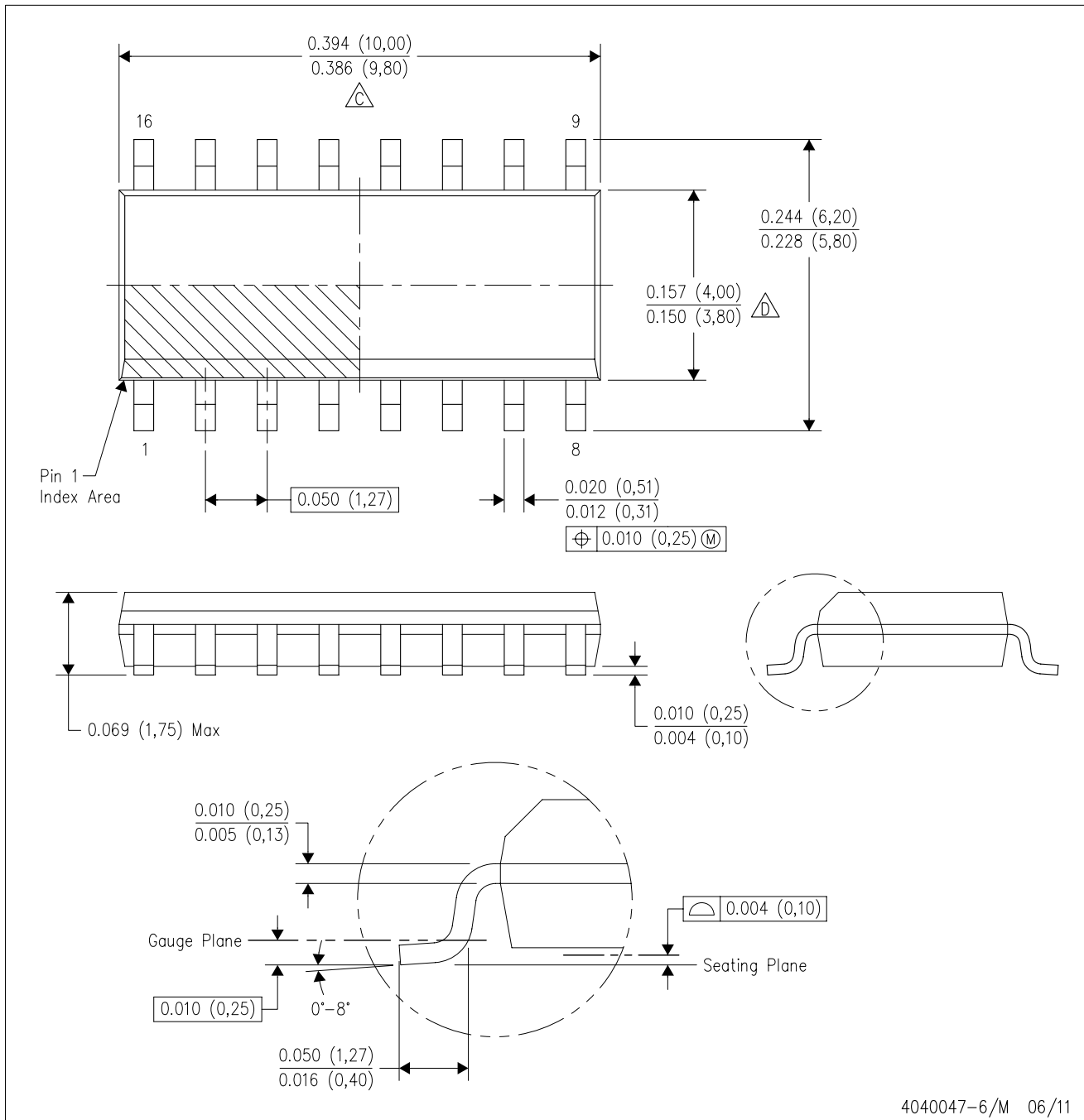
16 PINS SHOWN



- NOTES:
- 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-PDSO-G16)

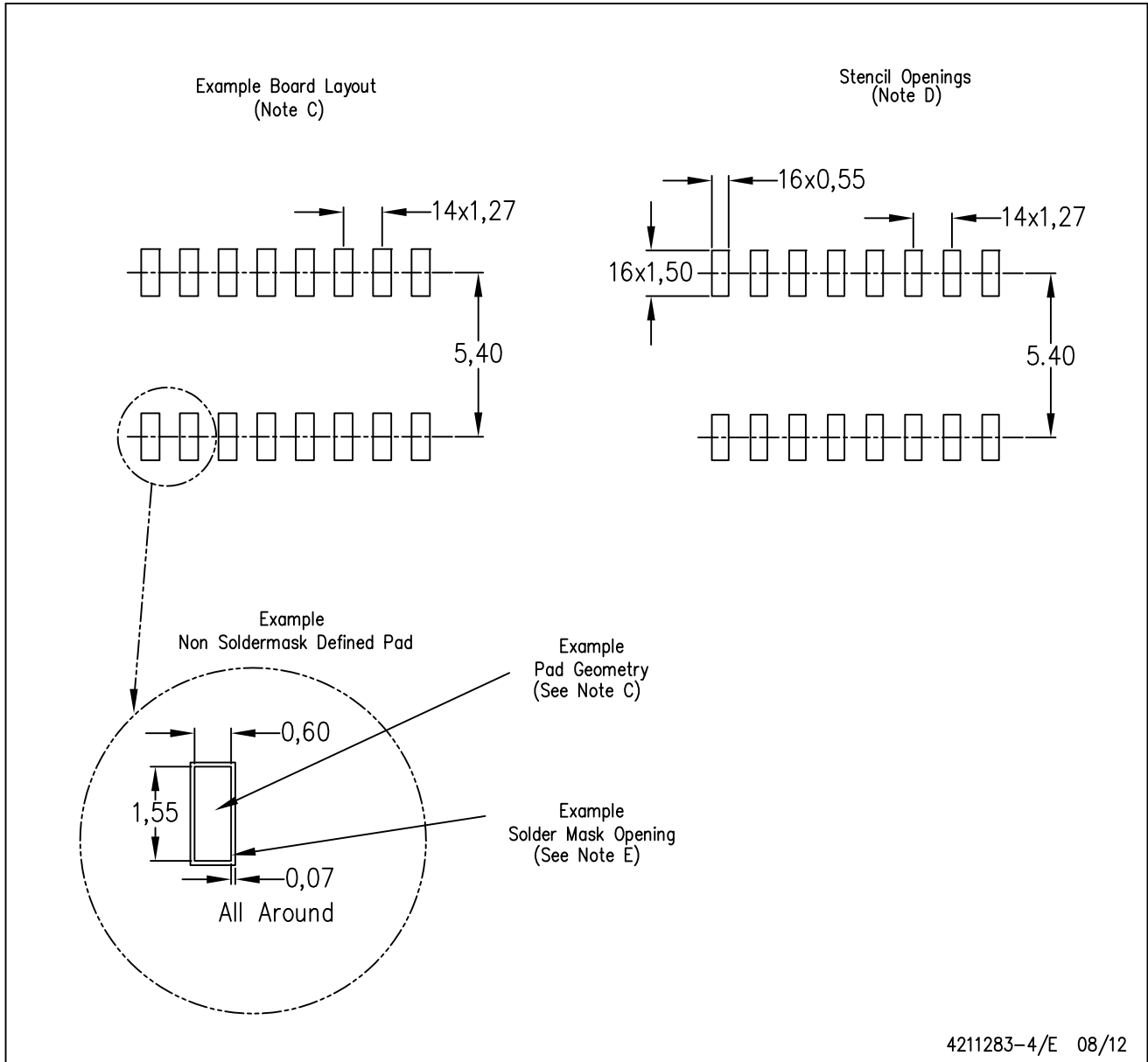
PLASTIC SMALL OUTLINE



- NOTES:
- A. All linear dimensions are in inches (millimeters).
  - 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 0.006 (0,15) each side.
  - 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 AC.

D (R-PDSO-G16)

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.

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### Applications

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Industrial	<a href="http://www.ti.com/industrial">www.ti.com/industrial</a>
Medical	<a href="http://www.ti.com/medical">www.ti.com/medical</a>
Security	<a href="http://www.ti.com/security">www.ti.com/security</a>
Space, Avionics and Defense	<a href="http://www.ti.com/space-avionics-defense">www.ti.com/space-avionics-defense</a>
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