

## SN74CBTLV3257 Low-Voltage 4-Bit 1-of-2 FET Multiplexer/Demultiplexer

### 1 Features

- 5-Ω Switch Connection Between Two Ports
- Rail-to-Rail Switching on Data I/O Ports
- $I_{off}$  Supports Partial-Power-Down Mode Operation
- Latch-Up Performance Exceeds 100 mA Per JESD 78, Class II
- ESD Protection Exceeds JESD 22
  - 2000-V Human-Body Model (A114-A)
  - 200-V Machine Model (A115-A)

### 2 Applications

- Internet of Things
- Wireless Headphones
- Television Set
- 4-Bit Bus Multiplexing and Demultiplexing

### 3 Description

The SN74CBTLV3257 device is a 4-bit 1-of-2 high-speed FET multiplexer/demultiplexer. The low on-state resistance of the switch allows connections to be made with minimal propagation delay.

The select (S) input controls the data flow. The FET multiplexers/demultiplexers are disabled when the output-enable ( $\overline{OE}$ ) input is high.

This device is fully specified for partial-power-down applications using  $I_{off}$ . The  $I_{off}$  feature ensures that damaging current will not backflow through the device when it is powered down. The device has isolation during power off.

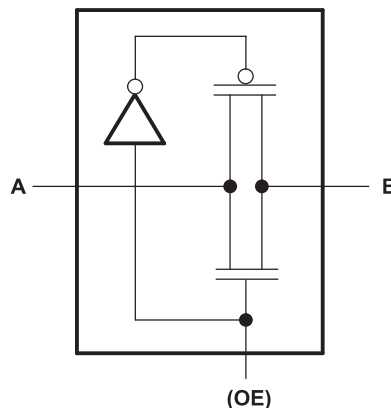
To ensure the high-impedance state during power up or power down,  $\overline{OE}$  should be tied to  $V_{CC}$  through a pullup resistor; the minimum value of the resistor is determined by the current-sinking capability of the driver.

#### Device Information<sup>(1)</sup>

PART NUMBER	PACKAGE	BODY SIZE (NOM)
SN74CBTLV3257	SSOP (16)	4.90 mm × 3.90 mm
	TVSOP (16)	3.60 mm × 4.40 mm
	SOIC (16)	9.90 mm × 3.91 mm
	VQFN (16)	4.00 mm × 3.50 mm
	UQFN (16)	2.60 mm × 1.80 mm

(1) For all available packages, see the orderable addendum at the end of the datasheet.

#### Simplified Schematic (Each FET Switch)



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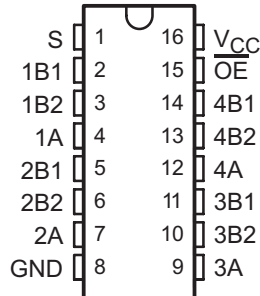
## 4 Revision History

Changes from Revision J (December 2012) to Revision K	Page
• Removed <i>Ordering Information</i> table. ....	1
• Added <i>Pin Configuration and Functions</i> section, <i>ESD Ratings</i> table, <i>Feature Description</i> section, <i>Device Functional Modes</i> , <i>Application and Implementation</i> section, <i>Power Supply Recommendations</i> section, <i>Layout</i> section, <i>Device and Documentation Support</i> section, and <i>Mechanical, Packaging, and Orderable Information</i> section .....	1
• Added <i>Applications</i> . ....	1
• Added <i>Device Information</i> table. ....	1

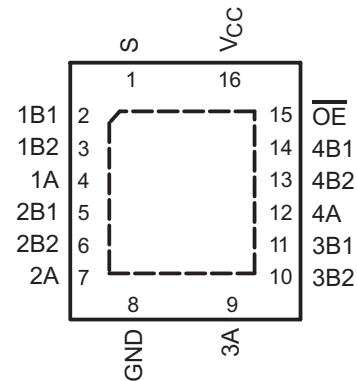
Changes from Revision I (October 2003) to Revision J	Page
• Added QFN ordering info and package pinout .....	1

## 5 Pin Configuration and Functions

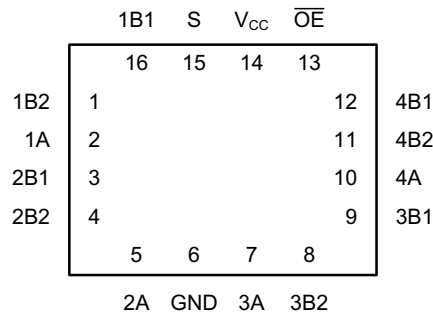
**D, DBQ, DGV, and PW Package  
16-Pin SOIC, SSOP, TVSOP, and TSSOP  
(Top View)**



**RGY Package  
16-Pin VQFN  
(Top View)**



**RSV Package  
16-Pin UQFN  
(Top View)**



### Pin Functions

NAME	PIN		I/O	DESCRIPTION
	SOIC, SSOP, TVSOP, TSSOP, VQFN	UQFN		
1A	4	2	I/O	Channel 1 out/in common
1B1	2	16	I/O	Channel 1 in/out 1
1B2	3	1	I/O	Channel 1 in/out 2
2A	7	5	I/O	Channel 2 out/in common
2B1	5	3	I/O	Channel 2 in/out 1
2B2	6	4	I/O	Channel 2 in/out 2
3A	9	7	I/O	Channel 3 out/in common
3B1	11	9	I/O	Channel 3 in/out 1
3B2	10	8	I/O	Channel 3 in/out 2
4A	12	10	I/O	Channel 4 out/in common
4B1	14	12	I/O	Channel 4 in/out 1
4B2	13	11	I/O	Channel 4 in/out 2
GND	8	6	—	Ground
$\overline{OE}$	15	13	I	Output Enable, active low
S	1	15	I	Select
$V_{CC}$	16	14	—	Power

## 6 Specifications

### 6.1 Absolute Maximum Ratings

 over operating free-air temperature range (unless otherwise noted)<sup>(1)</sup>

		MIN	MAX	UNIT
V <sub>CC</sub>	Supply voltage	-0.5	4.6	V
V <sub>I</sub>	Input voltage <sup>(2)</sup>	-0.5	4.6	V
	Continuous channel current		128	mA
I <sub>IK</sub>	Input clamp current	V <sub>I/O</sub> < 0	-50	mA
T <sub>stg</sub>	Storage temperature	-65	150	°C

- (1) Stresses beyond those listed under *Absolute Maximum Ratings* may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under *Recommended Operating Conditions* is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.
- (2) The input and output negative-voltage ratings may be exceeded if the input and output clamp-current ratings are observed.

### 6.2 ESD Ratings

		VALUE	UNIT
V <sub>(ESD)</sub>	Electrostatic discharge	Human-body model (HBM), per ANSI/ESDA/JEDEC JS-001 <sup>(1)</sup>	2000 V

- (1) JEDEC document JEP155 states that 500-V HBM allows safe manufacturing with a standard ESD control process.

### 6.3 Recommended Operating Conditions

 over operating free-air temperature range (unless otherwise noted)<sup>(1)</sup>

		MIN	MAX	UNIT
V <sub>CC</sub>	Supply voltage	2.3	3.6	V
V <sub>IH</sub>	High-level control input voltage	V <sub>CC</sub> = 2.3 V to 2.7 V V <sub>CC</sub> = 2.7 V to 3.6 V	1.7 2	V
V <sub>IL</sub>	Low-level control input voltage	V <sub>CC</sub> = 2.3 V to 2.7 V V <sub>CC</sub> = 2.7 V to 3.6 V	0.7 0.8	V
T <sub>A</sub>	Operating free-air temperature	-40	85	°C

- (1) All unused control inputs of the device must be held at V<sub>CC</sub> or GND to ensure proper device operation. Refer to the TI application report, *Implications of Slow or Floating CMOS Inputs*, literature number [SCBA004](#).

### 6.4 Thermal Information

THERMAL METRIC <sup>(1)</sup>	SN74CBTLV3257					UNIT	
	D	DBQ	DGV	PW	RGY		
	16 PINS	16 PINS	16 PINS	16 PINS	16 PINS		
R <sub>θJA</sub>	Junction-to-ambient thermal resistance	73	90	120	108	39	°C/W

- (1) For more information about traditional and new thermal metrics, see the *IC Package Thermal Metrics* application report, [SPRA953](#).

### 6.5 Electrical Characteristics

over recommended operating free-air temperature range (unless otherwise noted)

PARAMETER	TEST CONDITIONS		MIN	TYP <sup>(1)</sup>	MAX	UNIT
V <sub>IK</sub>	V <sub>CC</sub> = 3 V,	I <sub>I</sub> = -18 mA			-1.2	V
I <sub>I</sub>	V <sub>CC</sub> = 3.6 V,	V <sub>I</sub> = V <sub>CC</sub> or GND			±1	μA
I <sub>off</sub>	V <sub>CC</sub> = 0,	V <sub>I</sub> or V <sub>O</sub> = 0 to 3.6 V			15	μA
I <sub>CC</sub>	V <sub>CC</sub> = 3.6 V,	I <sub>O</sub> = 0, V <sub>I</sub> = V <sub>CC</sub> or GND			10	μA
ΔI <sub>CC</sub> <sup>(2)</sup>	Control inputs V <sub>CC</sub> = 3.6 V,	One input at 3 V,			300	μA
C <sub>i</sub>		V <sub>I</sub> = 3 V or 0			3	pF

- (1) All typical values are at V<sub>CC</sub> = 3.3 V (unless otherwise noted), T<sub>A</sub> = 25°C.

- (2) This is the increase in supply current for each input that is at the specified voltage level, rather than V<sub>CC</sub> or GND.

## Electrical Characteristics (continued)

over recommended operating free-air temperature range (unless otherwise noted)

PARAMETER		TEST CONDITIONS			MIN	TYP <sup>(1)</sup>	MAX	UNIT
C <sub>io(OFF)</sub>	A port	V <sub>O</sub> = 3 V or 0, $\overline{OE} = V_{CC}$			10.5		pF	
	B port				5.5			
r <sub>on</sub> <sup>(3)</sup>	V <sub>CC</sub> = 2.3 V, TYP at V <sub>CC</sub> = 2.5 V	V <sub>I</sub> = 0	I <sub>I</sub> = 64 mA		5	8	Ω	
			I <sub>I</sub> = 24 mA		5	8		
		V <sub>I</sub> = 1.7 V	I <sub>I</sub> = 15 mA		27	40		
	V <sub>CC</sub> = 3 V	V <sub>I</sub> = 0	I <sub>I</sub> = 64 mA		5	7		
			I <sub>I</sub> = 24 mA		5	7		
		V <sub>I</sub> = 2.4 V	I <sub>I</sub> = 15 mA		10	15		

(3) Measured by the voltage drop between the A and the B terminals at the indicated current through the switch. On-state resistance is determined by the lower of the voltages of the two (A or B) terminals.

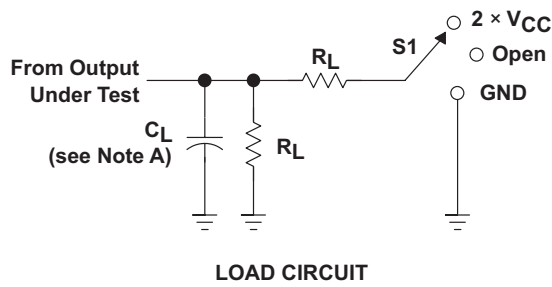
## 6.6 Switching Characteristics

over recommended operating free-air temperature range (unless otherwise noted) (See [Figure 1](#))

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V <sub>CC</sub> = 2.5 ± 0.2 V		V <sub>CC</sub> = 3.3 V ± 0.3 V		UNIT
			MIN	MAX	MIN	MAX	
t <sub>pd</sub>	A or B <sup>(1)</sup>	B or A	0.15		0.25		ns
	S	A or B	1.8	6.1	1.8	5.3	
t <sub>en</sub>	S	A or B	1.7	6.1	1.7	5.3	ns
t <sub>dis</sub>	S	A or B	1	4.8	1	4.5	ns
t <sub>en</sub>	$\overline{OE}$	A or B	1.9	5.6	2	5	ns
t <sub>dis</sub>	$\overline{OE}$	A or B	1	5.5	1.6	5.5	ns

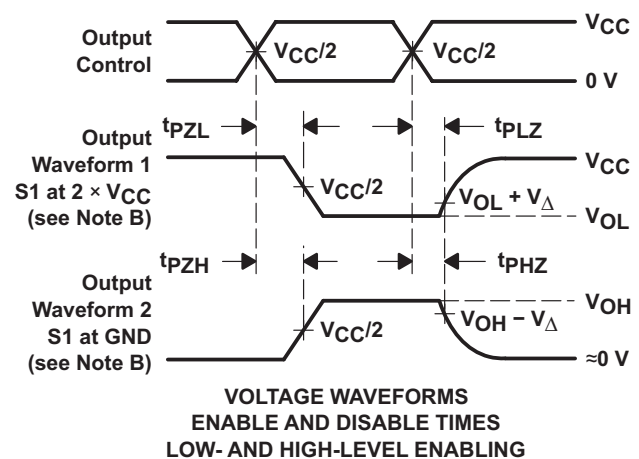
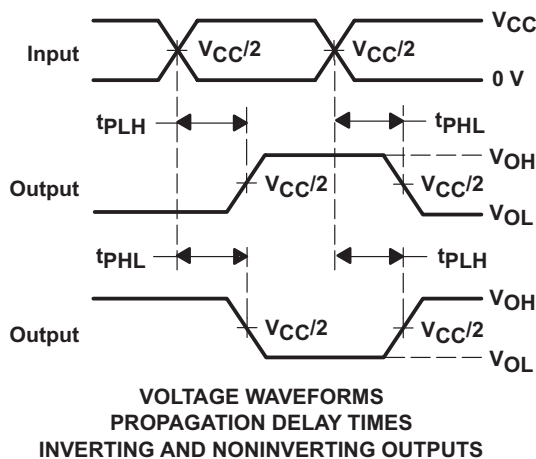
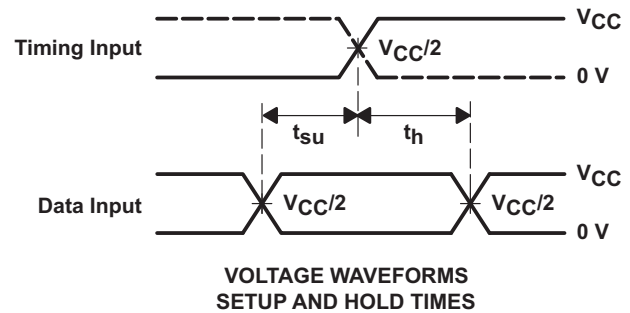
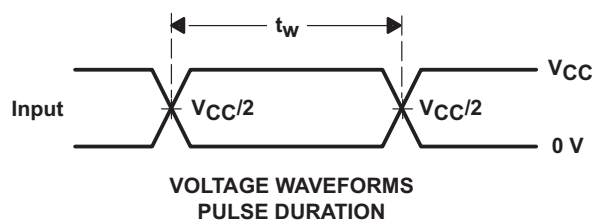
(1) The propagation delay is the calculated RC time constant of the typical on-state resistance of the switch and the specified load capacitance, when driven by an ideal voltage source (zero output impedance).

## 7 Parameter Measurement Information



TEST	S1
$t_{PLH}/t_{PHL}$	Open
$t_{PLZ}/t_{PZL}$	$2 \times V_{CC}$
$t_{PHZ}/t_{PZH}$	GND

$V_{CC}$	$C_L$	$R_L$	$V_{\Delta}$
$2.5 \text{ V} \pm 0.2 \text{ V}$	30 pF	500 $\Omega$	0.15 V
$3.3 \text{ V} \pm 0.3 \text{ V}$	50 pF	500 $\Omega$	0.3 V



- NOTES: A.  $C_L$  includes probe and jig capacitance.  
 B. Waveform 1 is for an output with internal conditions such that the output is low except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high except when disabled by the output control.  
 C. All input pulses are supplied by generators having the following characteristics: PRR  $\leq$  10 MHz,  $Z_O = 50 \Omega$ ,  $t_r \leq 2 \text{ ns}$ ,  $t_f \leq 2 \text{ ns}$ .  
 D. The outputs are measured one at a time with one transition per measurement.  
 E.  $t_{PLZ}$  and  $t_{PHZ}$  are the same as  $t_{dis}$ .  
 F.  $t_{PZL}$  and  $t_{PZH}$  are the same as  $t_{en}$ .  
 G.  $t_{PLH}$  and  $t_{PHL}$  are the same as  $t_{pd}$ .  
 H. All parameters and waveforms are not applicable to all devices.

**Figure 1. Load Circuit and Voltage Waveforms**

## 8 Detailed Description

### 8.1 Overview

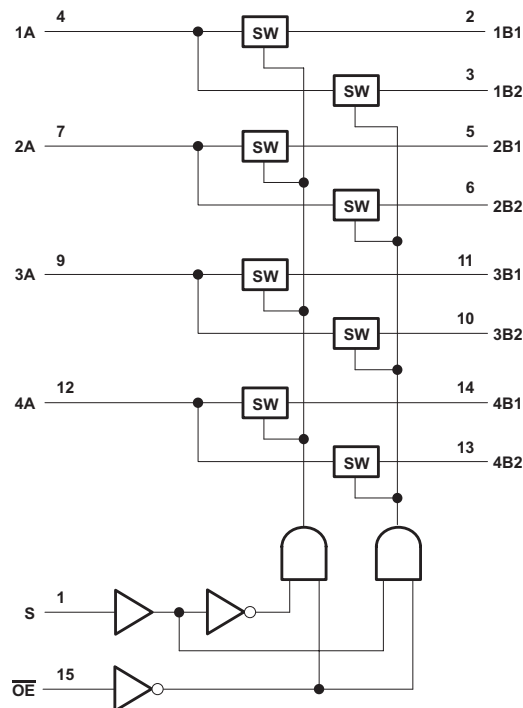
The SN74CBTLV3257 device is a 4-bit 1-of-2 high-speed FET multiplexer and demultiplexer. The low ON-state resistance of the switch allows connections to be made with minimal propagation delay.

The select (S) input controls the data flow. The FET multiplexers and demultiplexers are disabled when the output-enable ( $\overline{OE}$ ) input is high.

This device is fully specified for partial-power-down applications using  $I_{off}$ . The  $I_{off}$  feature ensures that damaging current will not backflow through the device when it is powered down. The device has isolation during power off.

To ensure the high-impedance state during power up or power down,  $\overline{OE}$  should be tied to  $V_{CC}$  through a pullup resistor; the minimum value of the resistor is determined by the current-sinking capability of the driver.

### 8.2 Functional Block Diagram



### 8.3 Feature Description

The SN74CBTLV3257 features 5- $\Omega$  switch connection between ports, allowing for low signal loss across the switch. Rail-to-rail switching on data I/O allows for full voltage swing outputs.  $I_{off}$  supports partial-power-down mode operation, protecting the chip from voltages at output ports when it is not powered on. Latch-up performance exceeds 100 mA per JESD 78, Class II.

### 8.4 Device Functional Modes

Table 1. Function Table

INPUTS		FUNCTION
$\overline{OE}$	S	
L	L	A port = B1 port
L	H	A port = B2 port
H	X	Disconnect

## 9 Application and Implementation

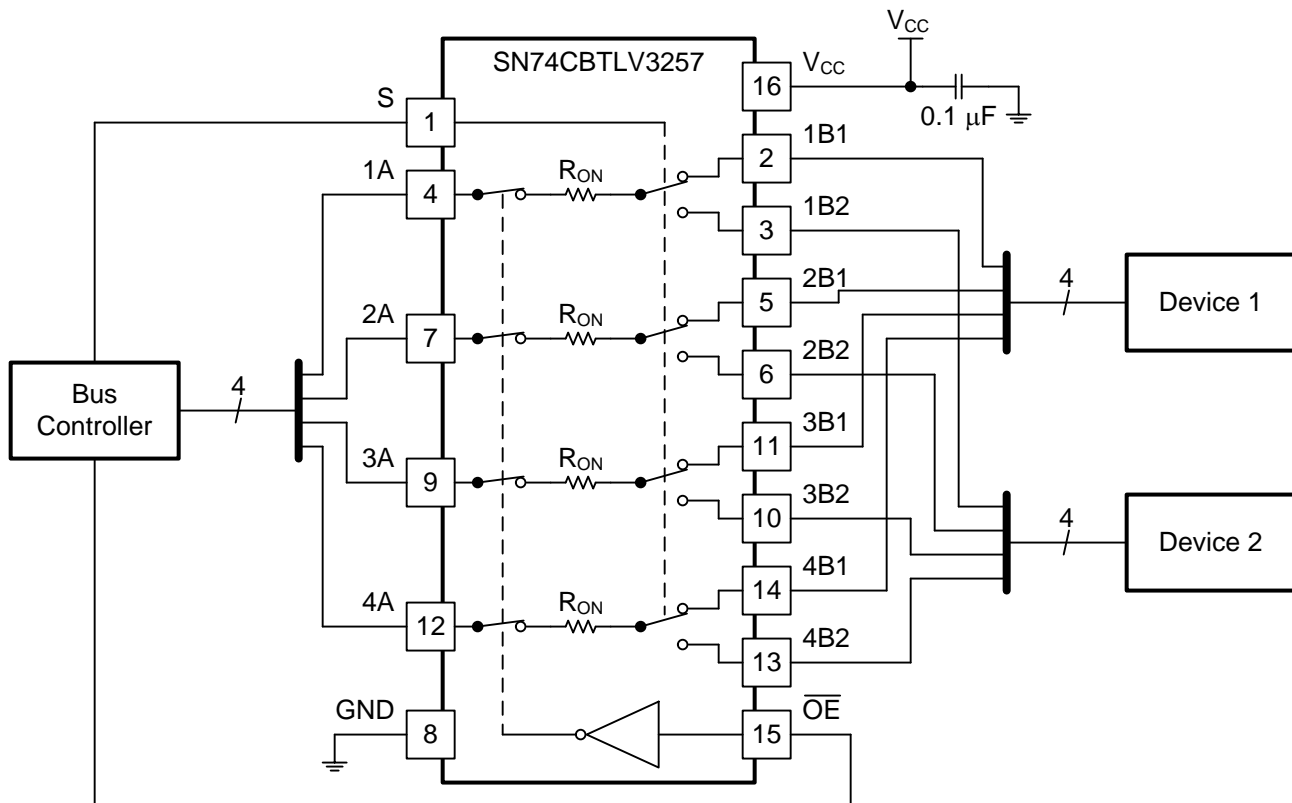
### NOTE

Information in the following applications sections is not part of the TI component specification, and TI does not warrant its accuracy or completeness. TI's customers are responsible for determining suitability of components for their purposes. Customers should validate and test their design implementation to confirm system functionality.

### 9.1 Application Information

The SN74CBTLV3257 can be used to multiplex and demultiplex up to 4 channels simultaneously in a 2:1 configuration. The application shown here is a 4-bit bus being multiplexed between two devices. The  $\overline{OE}$  and S pins are used to control the chip from the bus controller. This is a very generic example, and could apply to many situations. If an application requires less than 4 bits, be sure to tie the A side to either high or low on unused channels.

### 9.2 Typical Application



Typical Application of the SN74CBTLV3257.

#### 9.2.1 Design Requirements

1. Recommended Input Conditions:
  - For specified high and low levels, see  $V_{IH}$  and  $V_{IL}$  in [Recommended Operating Conditions](#).
  - Inputs and outputs are overvoltage tolerant allowing them to go as high as 4.6 V at any valid  $V_{CC}$ .
2. Recommended Output Conditions:
  - Load currents should not exceed  $\pm 128$  mA per channel.
3. Frequency Selection Criterion:
  - Maximum frequency tested is 200 MHz.



## Typical Application (continued)

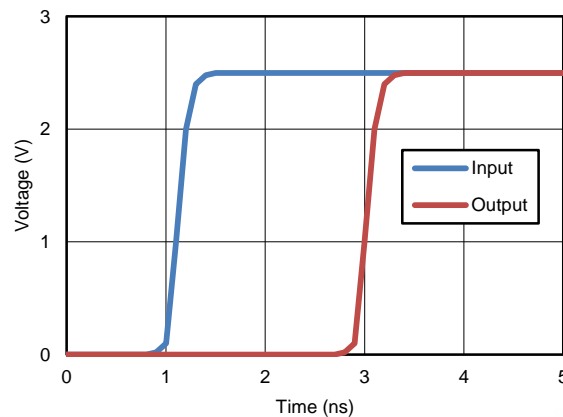
- Added trace resistance/capacitance can reduce maximum frequency capability; use layout practices as directed in [Layout](#).

### 9.2.2 Detailed Design Procedure

The 4-bit bus is connected directly to the 1A, 2A, 3A, and 4A ports (known as the xA port) on the SN74CBTLV3257, which essentially splits it into two busses, coming out of the xB1 and xB2 ports. When S is high, xB1 is the active bus, and when S is low, xB2 is the active bus. This means that Device 1 is connected to the bus controller when S is high, and Device 2 is connected to the bus controller when S is low. This setup is especially useful when two devices are hard coded with the same address and only one bus is available. The  $\overline{OE}$  connection can be used to disconnect all devices from the bus controller if necessary.

The 0.1- $\mu$ F capacitor on  $V_{CC}$  is a decoupling capacitor and should be placed as close as possible to the device.

### 9.2.3 Application Curve



Propagation Delay ( $t_{pd}$ ) Simulation Result at  $V_{CC} = 2.5$  V.

## 10 Power Supply Recommendations

The power supply can be any voltage between the minimum and maximum supply voltage rating listed in the [Recommended Operating Conditions](#) table.

Each  $V_{CC}$  terminal should have a good bypass capacitor to prevent power disturbance. For devices with a single supply, a 0.1- $\mu$ F bypass capacitor is recommended. If multiple pins are labeled  $V_{CC}$ , then a 0.01- $\mu$ F or 0.022- $\mu$ F capacitor is recommended for each  $V_{CC}$  because the  $V_{CC}$  pins are tied together internally. For devices with dual-supply pins operating at different voltages, for example  $V_{CC}$  and  $V_{DD}$ , a 0.1- $\mu$ F bypass capacitor is recommended for each supply pin. To reject different frequencies of noise, use multiple bypass capacitors in parallel. Capacitors with values of 0.1  $\mu$ F and 1  $\mu$ F are commonly used in parallel. The bypass capacitor should be installed as close to the power terminal as possible for best results.

## 11 Layout

### 11.1 Layout Guidelines

Reflections and matching are closely related to the loop antenna theory but are different enough to be discussed separately from the theory. When a PCB trace turns a corner at a 90° angle, a reflection can occur. A reflection occurs primarily because of the change of width of the trace. At the apex of the turn, the trace width increases to 1.414 times the width. This increase upsets the transmission-line characteristics, especially the distributed capacitance and self-inductance of the trace which results in the reflection. Not all PCB traces can be straight and therefore some traces must turn corners. [Figure 2](#) shows progressively better techniques of rounding corners. Only the last example (BEST) maintains constant trace width and minimizes reflections.

## 11.2 Layout Example

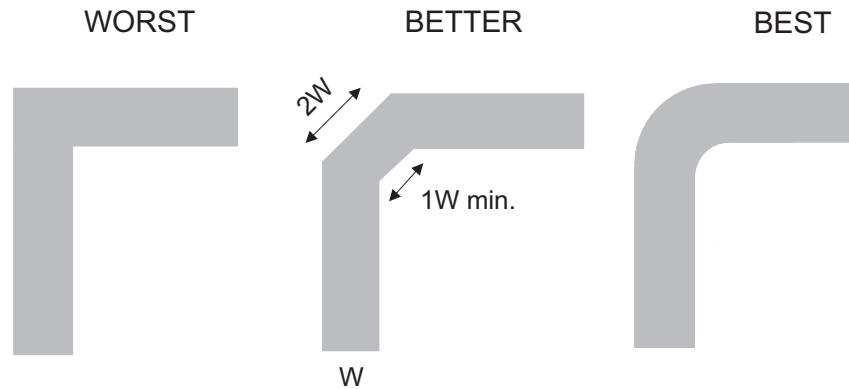


Figure 2. Trace Example

## 12 Device and Documentation Support

### 12.1 Documentation Support

#### 12.1.1 Related Documentation

For related documentation see the following:

- *Implications of Slow or Floating CMOS Inputs*, [SCBA004](#)
- *Selecting the Right Texas Instruments Signal Switch*, [SZZA030](#)

### 12.2 Trademarks

All trademarks are the property of their respective owners.

### 12.3 Electrostatic Discharge Caution



These devices have limited built-in ESD protection. The leads should be shorted together or the device placed in conductive foam during storage or handling to prevent electrostatic damage to the MOS gates.

### 12.4 Glossary

[SLYZ022](#) — *TI Glossary*.



This glossary lists and explains terms, acronyms, and definitions.

## 13 Mechanical, Packaging, and Orderable Information

The following pages include mechanical, packaging, and orderable information. This information is the most current data available for the designated devices. This data is subject to change without notice and revision of this document. For browser-based versions of this data sheet, refer to the left-hand navigation.

**PACKAGING INFORMATION**

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
74CBTLV3257DBQRE4	ACTIVE	SSOP	DBQ	16	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	-40 to 85	CL257	<a href="#">Samples</a>
74CBTLV3257DBQRG4	ACTIVE	SSOP	DBQ	16	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	-40 to 85	CL257	<a href="#">Samples</a>
74CBTLV3257PWRE4	ACTIVE	TSSOP	PW	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	CL257	<a href="#">Samples</a>
74CBTLV3257PWRG4	ACTIVE	TSSOP	PW	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	CL257	<a href="#">Samples</a>
74CBTLV3257RGYRG4	ACTIVE	VQFN	RGY	16	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	-40 to 85	CL257	<a href="#">Samples</a>
SN74CBTLV3257D	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	CBTLV3257	<a href="#">Samples</a>
SN74CBTLV3257DBQR	ACTIVE	SSOP	DBQ	16	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	-40 to 85	CL257	<a href="#">Samples</a>
SN74CBTLV3257DE4	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	CBTLV3257	<a href="#">Samples</a>
SN74CBTLV3257DG4	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	CBTLV3257	<a href="#">Samples</a>
SN74CBTLV3257DGVR	ACTIVE	TVSOP	DGV	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	CL257	<a href="#">Samples</a>
SN74CBTLV3257DR	ACTIVE	SOIC	D	16	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	CBTLV3257	<a href="#">Samples</a>
SN74CBTLV3257DRE4	ACTIVE	SOIC	D	16	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	CBTLV3257	<a href="#">Samples</a>
SN74CBTLV3257DRG4	ACTIVE	SOIC	D	16	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	CBTLV3257	<a href="#">Samples</a>
SN74CBTLV3257PW	ACTIVE	TSSOP	PW	16	90	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	CL257	<a href="#">Samples</a>
SN74CBTLV3257PWE4	ACTIVE	TSSOP	PW	16	90	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	CL257	<a href="#">Samples</a>
SN74CBTLV3257PWG4	ACTIVE	TSSOP	PW	16	90	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	CL257	<a href="#">Samples</a>
SN74CBTLV3257PWR	ACTIVE	TSSOP	PW	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU   CU SN	Level-1-260C-UNLIM	-40 to 85	CL257	<a href="#">Samples</a>

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
SN74CBTLV3257RGYR	ACTIVE	VQFN	RGY	16	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	-40 to 85	CL257	
SN74CBTLV3257RSVR	ACTIVE	UQFN	RSV	16	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	ZTR	

(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.

**OBSELETE:** 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) 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 SN74CBTLV3257 :**

- Enhanced Product: [SN74CBTLV3257-EP](#)

## NOTE: Qualified Version Definitions:

- Enhanced Product - Supports Defense, Aerospace and Medical 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
74CBTLV3257PWRG4	TSSOP	PW	16	2000	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1
SN74CBTLV3257DGVR	TVSOP	DGV	16	2000	330.0	12.4	6.8	4.0	1.6	8.0	12.0	Q1
SN74CBTLV3257DR	SOIC	D	16	2500	330.0	16.4	6.5	10.3	2.1	8.0	16.0	Q1
SN74CBTLV3257PWR	TSSOP	PW	16	2000	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1
SN74CBTLV3257RGYR	VQFN	RGY	16	3000	330.0	12.4	3.8	4.3	1.5	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)
74CBTLV3257PWRG4	TSSOP	PW	16	2000	367.0	367.0	35.0
SN74CBTLV3257DGVR	TVSOP	DGV	16	2000	367.0	367.0	35.0
SN74CBTLV3257DR	SOIC	D	16	2500	333.2	345.9	28.6
SN74CBTLV3257PWR	TSSOP	PW	16	2000	364.0	364.0	27.0
SN74CBTLV3257RGYR	VQFN	RGY	16	3000	355.0	350.0	50.0

DGV (R-PDSO-G\*\*)

PLASTIC SMALL-OUTLINE

24 PINS SHOWN



- 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 per side.  
 D. Falls within JEDEC: 24/48 Pins – MO-153  
 14/16/20/56 Pins – MO-194





D (R-PDSO-G16)

PLASTIC SMALL OUTLINE



4040047-6/M 06/11

- 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)

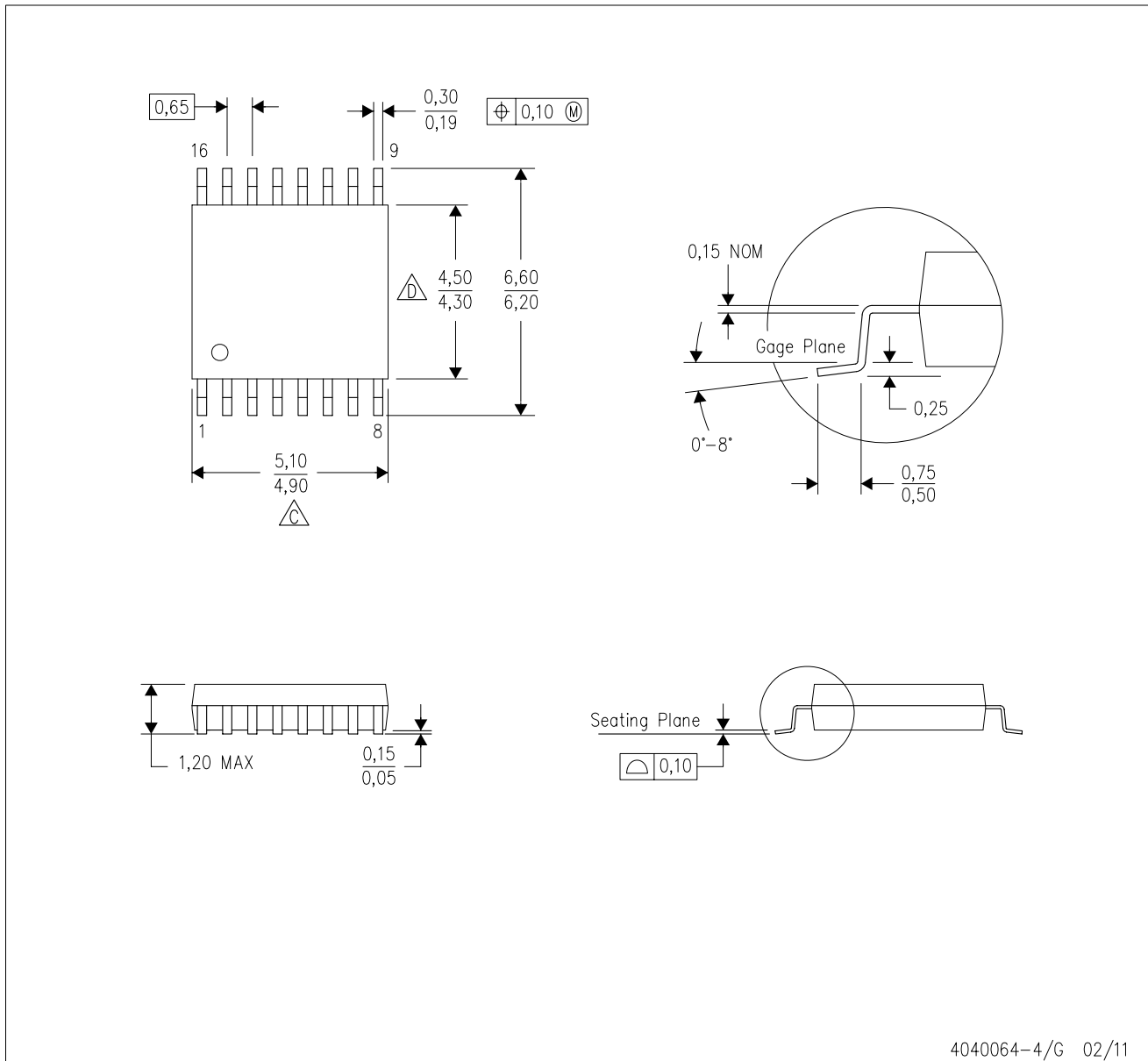
PLASTIC SMALL OUTLINE



- 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.

PW (R-PDSO-G16)

PLASTIC SMALL OUTLINE

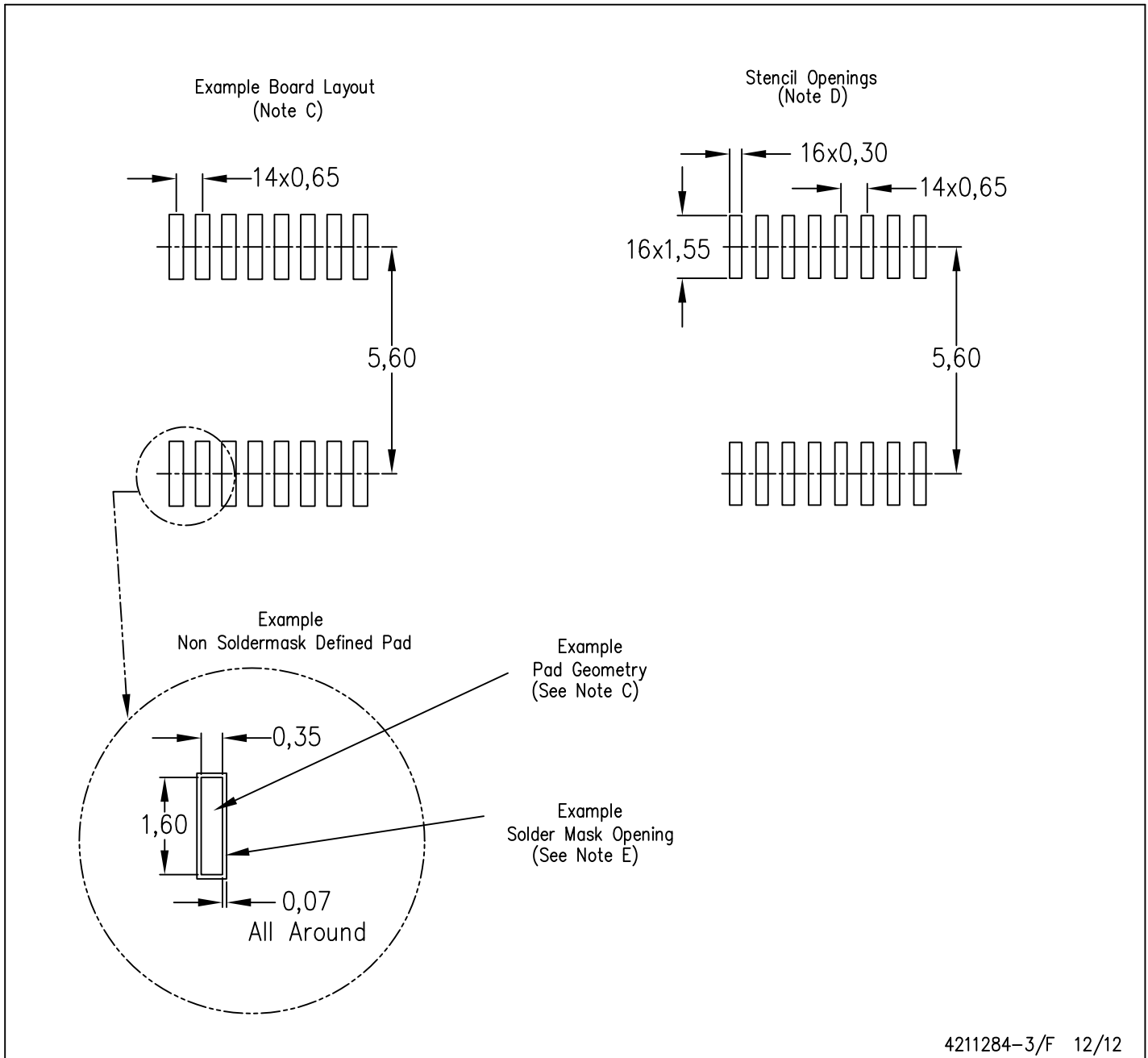


4040064-4/G 02/11

- 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

PW (R-PDSO-G16)

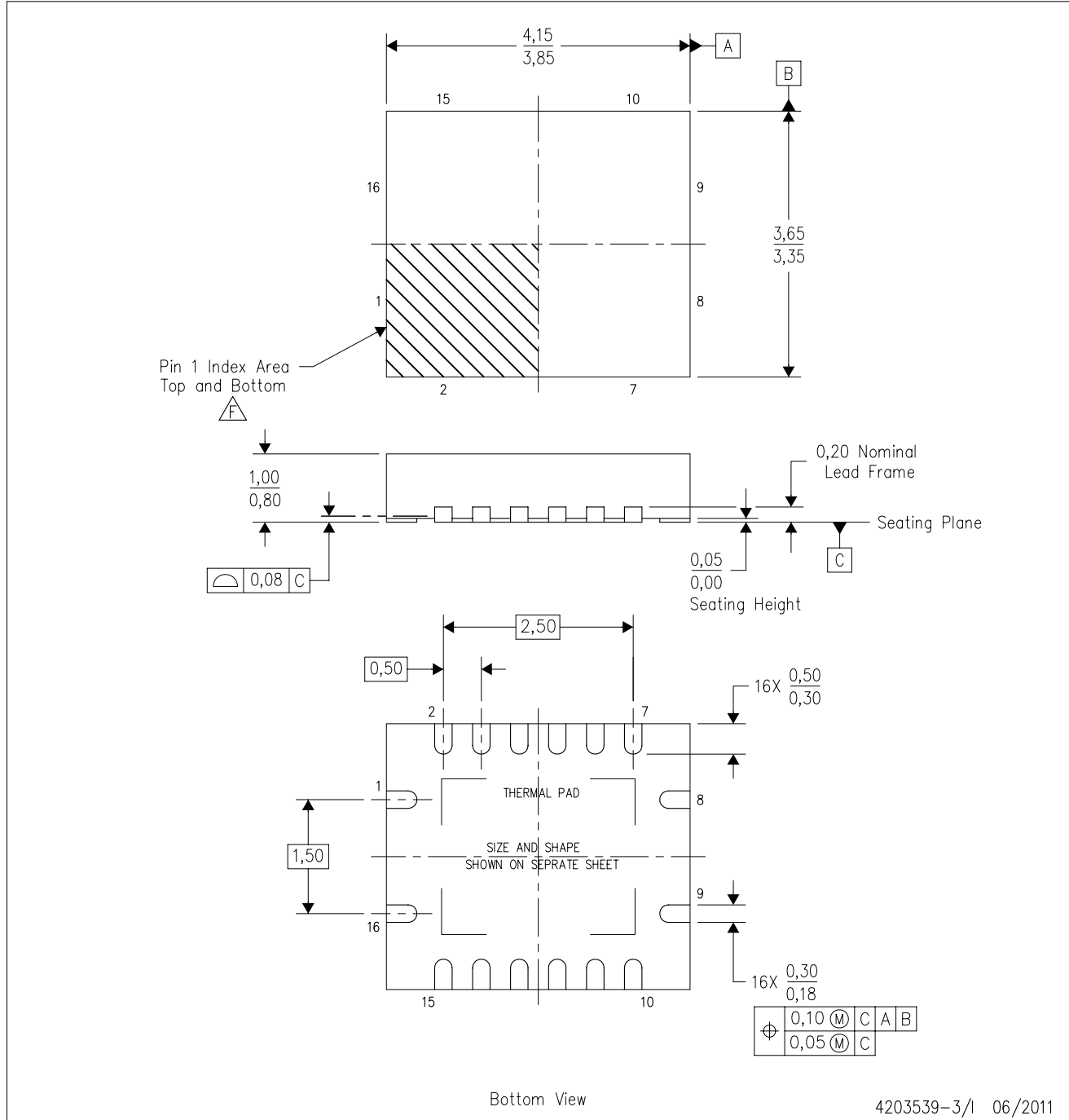
PLASTIC SMALL OUTLINE



- 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.

RGY (R-PVQFN-N16)

PLASTIC QUAD FLATPACK NO-LEAD



- 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. QFN (Quad Flatpack No-Lead) package configuration.
  - D. The package thermal pad must be soldered to the board for thermal and mechanical performance.
  - E. See the additional figure in the Product Data Sheet for details regarding the exposed thermal pad features and dimensions.
  - F. Pin 1 identifiers are located on both top and bottom of the package and within the zone indicated. The Pin 1 identifiers are either a molded, marked, or metal feature.
  - G. Package complies to JEDEC MO-241 variation BA.

RGY (R-PVQFN-N16)

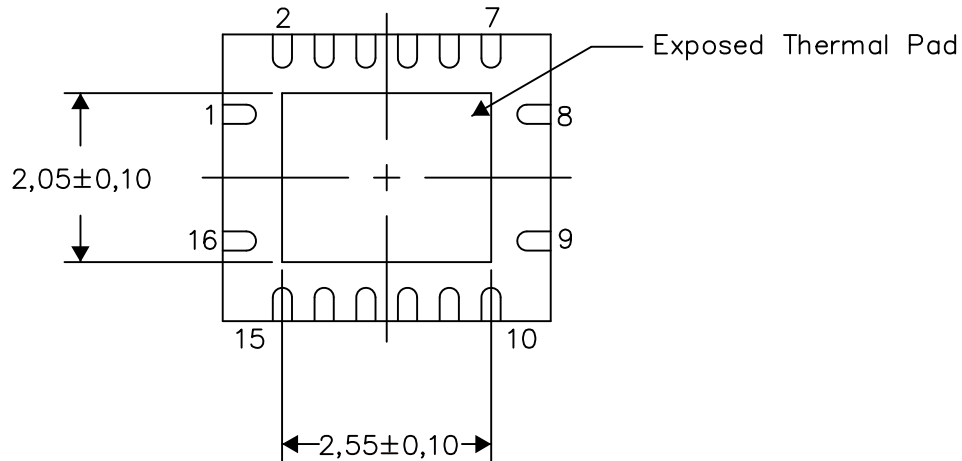
PLASTIC QUAD FLATPACK NO-LEAD

**THERMAL INFORMATION**

This package incorporates an exposed thermal pad that is designed to be attached directly to an external heatsink. The thermal pad must be soldered directly to the printed circuit board (PCB). After soldering, the PCB can be used as a heatsink. In addition, through the use of thermal vias, the thermal pad can be attached directly to the appropriate copper plane shown in the electrical schematic for the device, or alternatively, can be attached to a special heatsink structure designed into the PCB. This design optimizes the heat transfer from the integrated circuit (IC).

For information on the Quad Flatpack No-Lead (QFN) package and its advantages, refer to Application Report, QFN/SON PCB Attachment, Texas Instruments Literature No. SLUA271. This document is available at [www.ti.com](http://www.ti.com).

The exposed thermal pad dimensions for this package are shown in the following illustration.



Bottom View

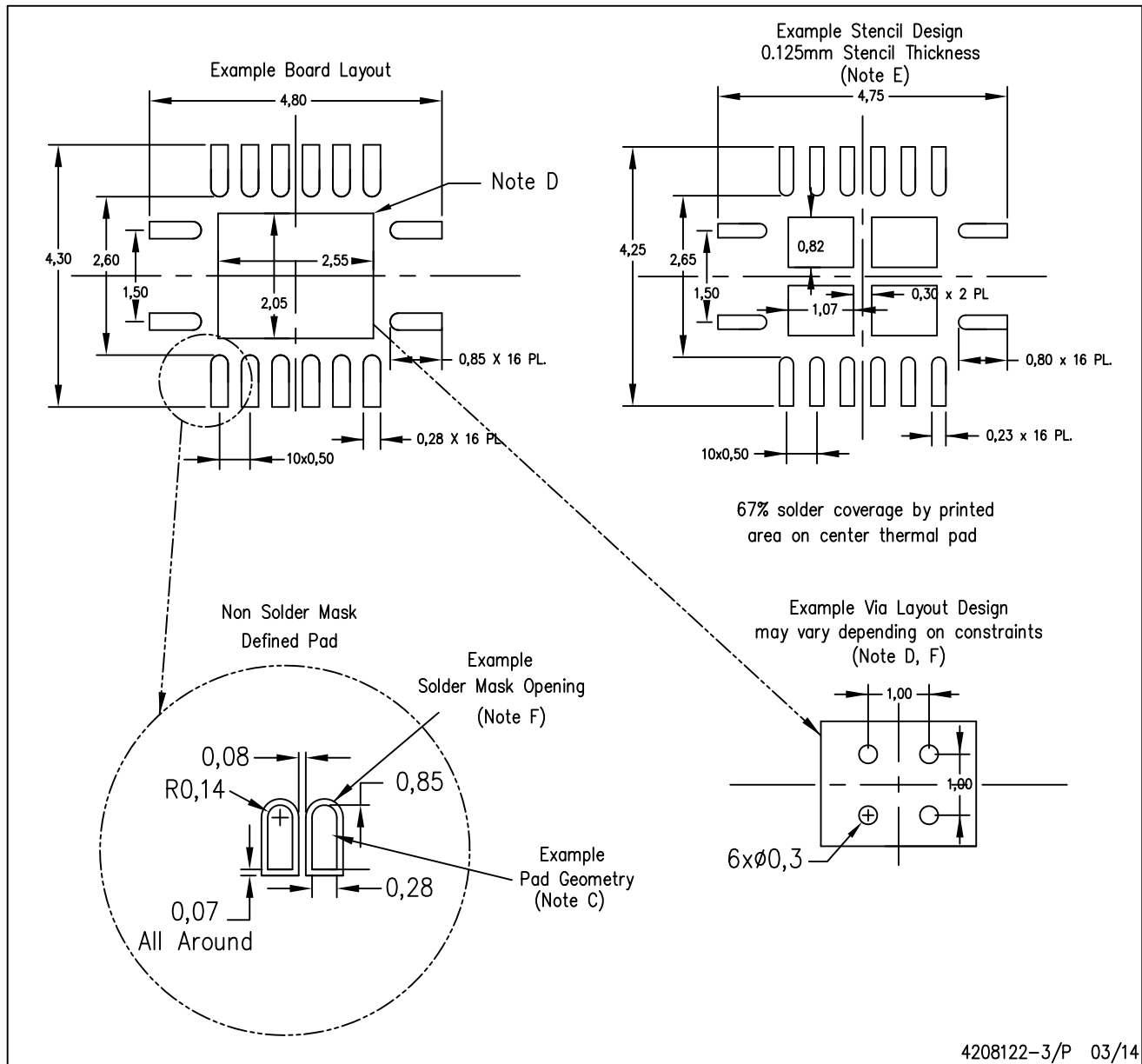
Exposed Thermal Pad Dimensions

4206353-3/P 03/14

NOTE: All linear dimensions are in millimeters

RGY (R-PVQFN-N16)

PLASTIC QUAD FLATPACK NO-LEAD

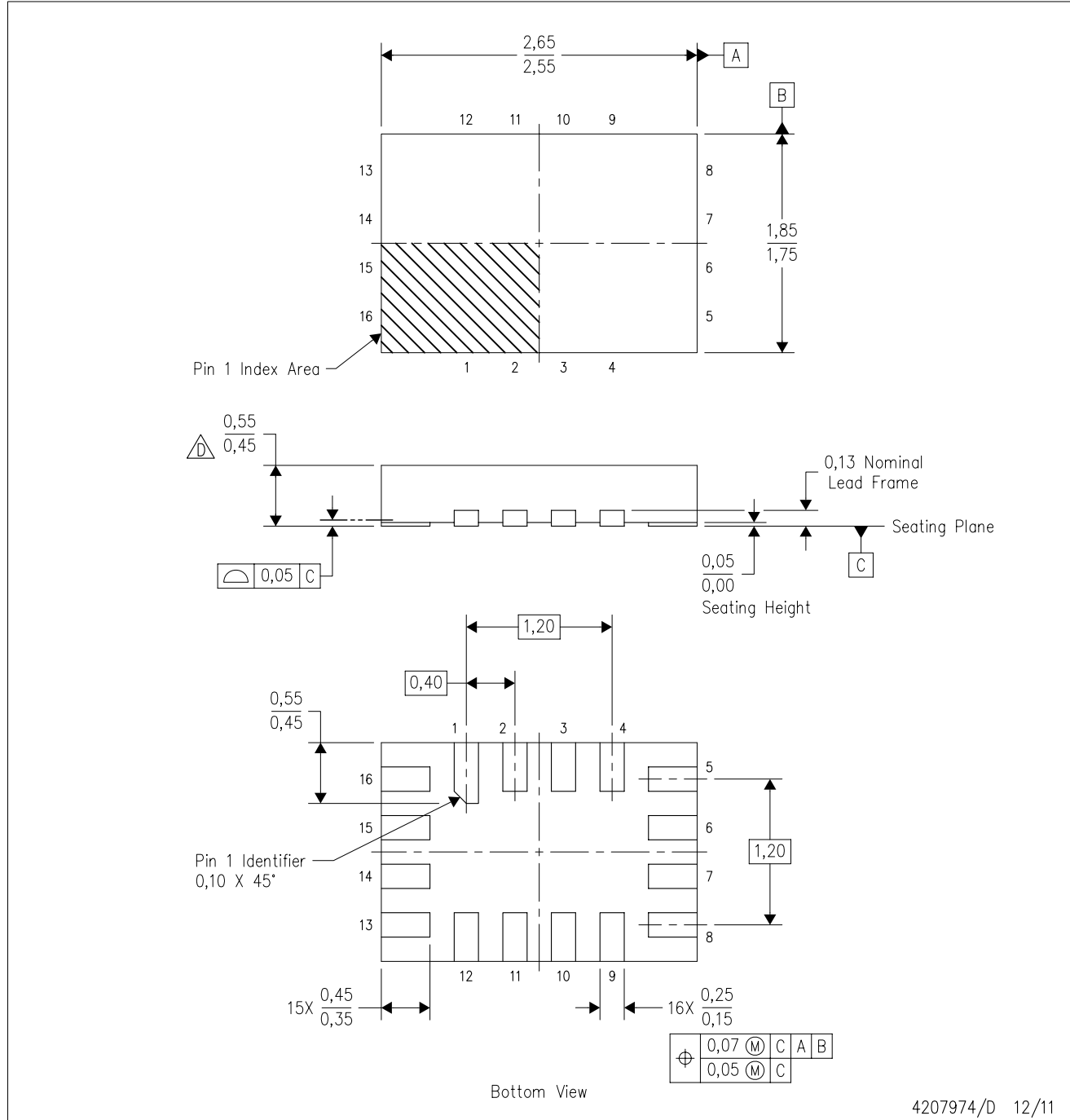


4208122-3/P 03/14


- 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. This package is designed to be soldered to a thermal pad on the board. Refer to Application Note, Quad Flat-Pack QFN/SON PCB Attachment, Texas Instruments Literature No. SLUA271, and also the Product Data Sheets for specific thermal information, via requirements, and recommended board layout. These documents are available at [www.ti.com](http://www.ti.com) <<http://www.ti.com>>.
  - E. 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 stencil design considerations.
  - F. Customers should contact their board fabrication site for minimum solder mask web tolerances between signal pads.

RSV (R-PUQFN-N16)

PLASTIC QUAD FLATPACK NO-LEAD



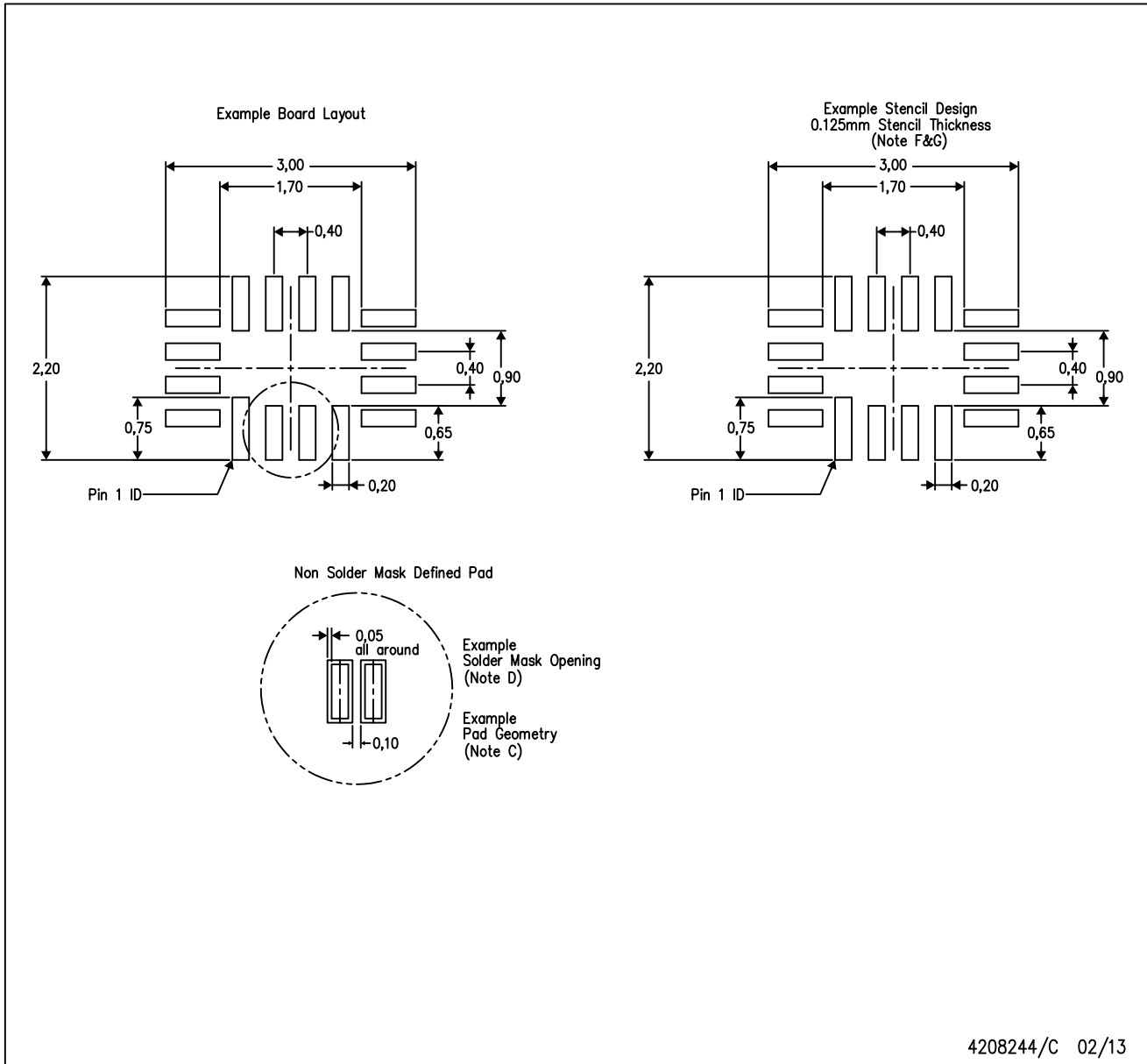
4207974/D 12/11

- 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. QFN (Quad Flatpack No-Lead) package configuration.
  -  This package complies to JEDEC MO-288 variation UFHE, except minimum package thickness.



RSV (R-PUQFN-N16)

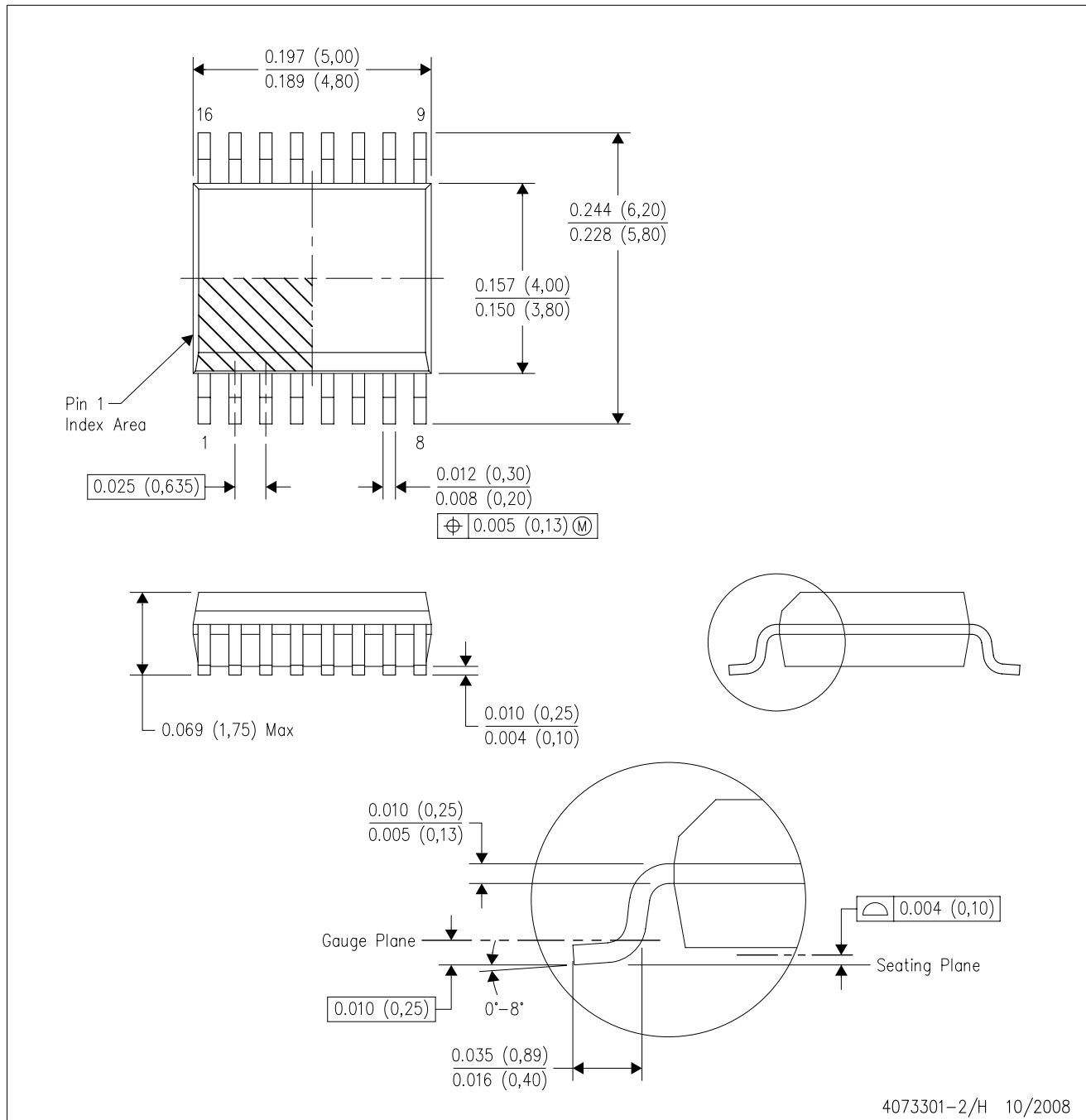
PLASTIC QUAD FLATPACK NO-LEAD



- 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. Customers should contact their board fabrication site for minimum solder mask web tolerances between signal pads.
  - E. Maximum stencil thickness 0,127 mm (5 mils). All linear dimensions are in millimeters.
  - F. 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 stencil design considerations.
  - G. Side aperture dimensions over-print land for acceptable area ratio > 0.66. Customer may reduce side aperture dimensions if stencil manufacturing process allows for sufficient release at smaller opening.

DBQ (R-PDSO-G16)

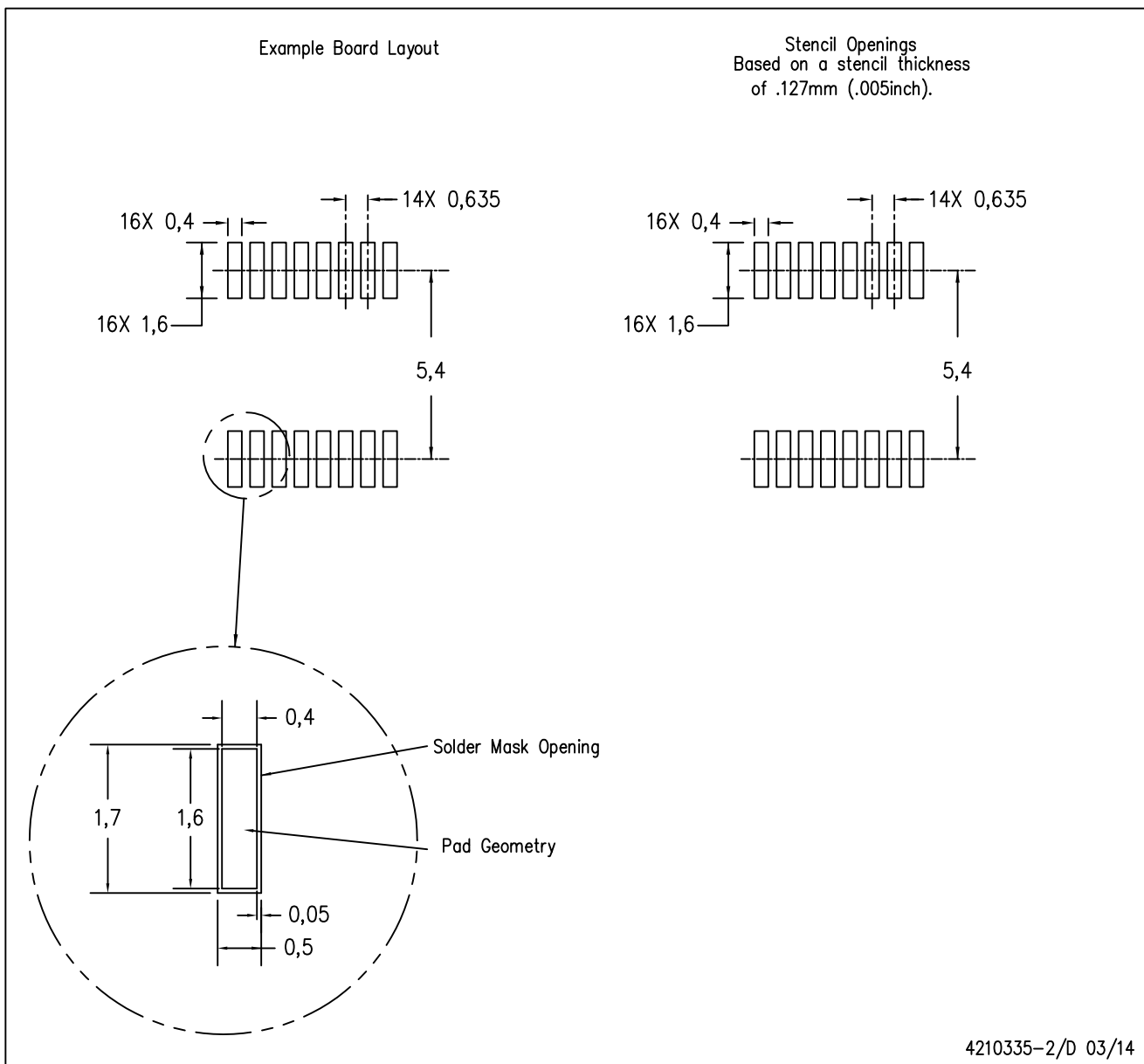
PLASTIC SMALL-OUTLINE PACKAGE



- NOTES:
- A. All linear dimensions are in inches (millimeters).
  - B. This drawing is subject to change without notice.
  - C. Body dimensions do not include mold flash or protrusion not to exceed 0.006 (0,15) per side.
  - D. Falls within JEDEC MO-137 variation AB.

DBQ (R-PDSO-G16)

PLASTIC SMALL OUTLINE PACKAGE



- 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. Example stencil design based on a 50% volumetric metal load solder paste. Refer to IPC-7525 for other stencil recommendations.

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Medical	<a href="http://www.ti.com/medical">www.ti.com/medical</a>
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