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Texas Instruments
SN74CBT3244PWR

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SN74CBT3244 Octal FET Bus Switch

1 Features

- High-Bandwidth Data Path (Up to 200 MHz)
- Control Inputs Can Be Driven by TTL or 5-V/3.3-V CMOS Outputs
- Low and Flat ON-State Resistance (r_{on}) Characteristics Over Operating Range (r_{on}= 5 Ω Typical)
- Bidirectional Data Flow With Near-Zero Propagation Delay
- Low Input/Output Capacitance Minimizes Loading and Signal Distortion ($C_{io(OFF)}$ = 6 pF Typical)
- Low Power Consumption (I_{CC} = 50 µA Maximum)
- V_{CC} Operating Range From 4.5 V to 5 V
- Data I/Os Support 0- to 5-V Signaling Levels (0.8 V, 1.2 V, 1.5 V, 1.8 V, 2.5 V, 3.3 V, 5 V)
- Standard ’244-Type Pinout

2 Applications

- Multi-Processor Communications
- Test and Measurement Systems
- Factory Automation Control Boards
- Building Automation Control Boards

3 Description

The SN74CBT3244 device provides eight bits of high-speed TTL-compatible bus switching. The SOIC, SSOP, TSSOP, and TVSOP packages provide a standard ’244 device pinout. The low ON-state resistance of the switch allows connections to be made with minimal propagation delay. The device is organized as two 4-bit low-impedance switches with separate output-enable ($\overline{OE}$) inputs.

Device Information[(1)]

PART NUMBER	PACKAGE	BODY SIZE (NOM)
SN74CBT3244RGY	VQFN (20)	3.35 mm x 4.35 mm
SN74CBT3244DW	SOIC (20)	9.97 mm x 12.60 mm
SN74CBT3244DB	SSOP (20)	5.80 mm x 8.55 mm
SN74CBT3244DBQ	SSOP (20)	8.65 mm × 3.90 mm
SN74CBT3244PW	TSSOP (20)	5.00 mm × 4.40 mm

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

Simplified Schematic

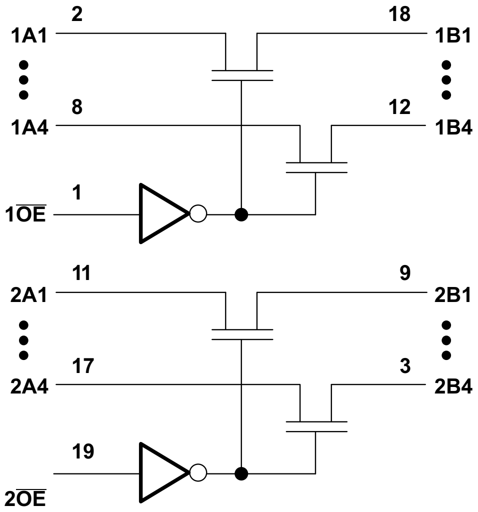


Table of Contents

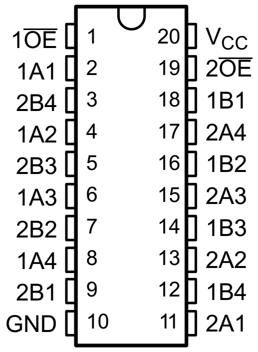
4 Revision History

Changes from Revision N (September 2003) to Revision O **Page**

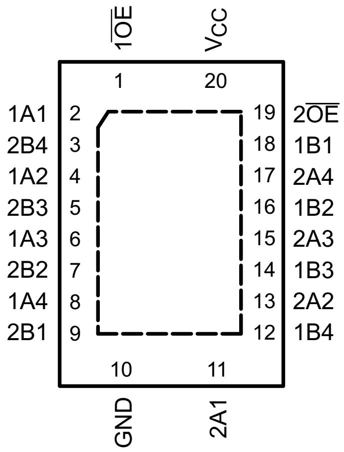
- Added *Pin Configuration and Functions* section, *ESD Ratings* table, *Feature Description* section, *Device Functional Modes*, *Application and Implementation* section, *Power Supply Recommendations* section, *Layout* section, *Device and Documentation Support* section, and *Mechanical, Packaging, and Orderable Information* section ... 1

5 Pin Configuration and Functions

DB, DBQ, DGV, or PW Package
20-Pin SSOP, TVSOP, or TSSOP
Top View



RGY Package
20-Pin VQFN
Top View



Pin Functions

PIN		I/O	DESCRIPTION
NAME	DB, DBQ, DGV, PW, SSOP, TVSOP,TSSOP, VQFN		
1A1	2	I/O	Transceiver I/O pin
1A2	4	I/O	Transceiver I/O pin
1A3	6	I/O	Transceiver I/O pin
1A4	8	I/O	Transceiver I/O pin
2A1	11	I/O	Transceiver I/O pin
2A2	13	I/O	Transceiver I/O pin
2A3	15	I/O	Transceiver I/O pin
2A4	17	I/O	Transceiver I/O pin
1B1	18	I/O	Transceiver I/O pin
1B2	16	I/O	Transceiver I/O pin
1B3	14	I/O	Transceiver I/O pin
1B4	12	I/O	Transceiver I/O pin
2B1	9	I/O	Transceiver I/O pin
2B2	7	I/O	Transceiver I/O pin
2B3	5	I/O	Transceiver I/O pin
2B4	3	I/O	Transceiver I/O pin
$\overline{1OE}$	1	I	Output Enable. When high A and B are disconnected, when Low A and B are connected
$\overline{2OE}$	19	I	Output Enable. When high A and B are disconnected, when Low A and B are connected
GND	10	—	Ground
V_{CC}	20	—	Power pin

6 Specifications

6.1 Absolute Maximum Ratings

over operating free-air temperature range (unless otherwise noted)(1)

	MIN	MAX	UNIT
Supply voltage, V_{CC}	–0.5	7	V
Input voltage, V_I (2)	–0.5	7	V
Continuous channel current		128	mA
Clamp current, I_K ($V_{I/O}$ < 0)		–50	mA
Storage temperature, T_{stg}	–65	150	°C

(1) Stresses beyond those listed under *Absolute Maximum Ratings* may cause permanent damage to the device. These are stress ratings only, which do not imply functional operation of the device at these or any other conditions beyond those indicated under *Recommended Operating Conditions*. 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
$V_{(ESD)}$	Electrostatic discharge	Human body model (HBM), per ANSI/ESDA/JEDEC JS-001(1)	±1500	V
		Charged-device model (CDM), per JEDEC specification JESD22-C101(2)	±500	

(1) JEDEC document JEP155 states that 500-V HBM allows safe manufacturing with a standard ESD control process.
(2) JEDEC document JEP157 states that 250-V CDM allows safe manufacturing with a standard ESD control process.

6.3 Recommended Operating Conditions

over operating free-air temperature range (unless otherwise noted)(1)

		MIN	MAX	UNIT
V_{CC}	Supply voltage	4.5	5.5	V
V_{IH}	High-level control input voltage	2		V
V_{IL}	Low-level control input voltage		0.8	V
T_A	Operating free-air temperature	–40	85	°C

(1) All unused control inputs of the device must be held at V_{CC} or GND to ensure proper device operation. Refer to the TI application report, *Implications of Slow or Floating CMOS Inputs*, SCBA004.

6.4 Thermal Information Package

THERMAL METRIC(1)(2)		SN74CBT3244					UNIT
		DB (SSOP)	DBQ (SSOP)	DGV (TVSOP)	PW (TSSOP)	RGY (VQFN)	
		20 PINS	20 PINS	20 PINS	20 PINS	20 PINS	
$R_{\theta JA}$	Junction-to-ambient thermal resistance	70	68	92	83	37	°C/W

(1) For more information about traditional and new thermal metrics, see the *Semiconductor and IC Package Thermal Metrics* application report, SPRA953.
(2) The package thermal impedance is calculated in accordance with JESD 51-7.

6.5 Electrical Characteristics

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

PARAMETER		TEST CONDITIONS			MIN	TYP[(1)]	MAX	UNIT
V_{IK}		V_{CC} = 4.5 V	I_I = –18 mA				–1.2	V
I_I		V_{CC} = 5.5 V	V_I = 5.5 V or GND				±5	µA
I_{CC}		V_{CC} = 5.5 V	I_O = 0,	V_I = V_{CC} or GND			50	µA
ΔI_{CC}[(2)]	Control inputs	V_{CC} = 5.5 V	One input at 3.4 V,	Other inputs at V_{CC} or GND			3.5	mA
C_i	Control inputs	V_I = 3 V or 0				3		pF
$C_{io(OFF)}$		V_O = 3 V or 0	$\overline{OE}$ = V_{CC}			6		pF
r_{on}[(3)]		V_{CC} = 4.5 V	V_I = 0 V	I_I = 64 mA		5	7	Ω
				I_I = 30 mA		5	7	
			V_I = 2.4 V	I_I = 15 mA		10	15	

(1) All typical values are at V_{CC} = 5 V, T_A = 25°C.
(2) This is the increase in supply current for each input that is at the specified TTL voltage level, rather than V_{CC} or GND.
(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 lowest voltage of the two (A or B) terminals.

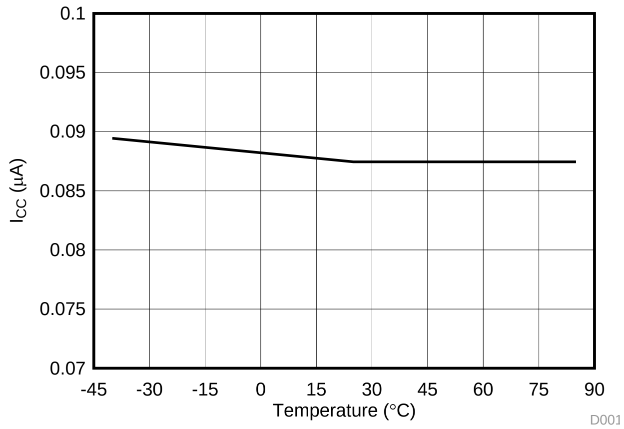
6.6 Switching Characteristics

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

PARAMETER	FROM (INPUT)	TO (OUTPUT)	MIN	TYP	MAX	UNIT
t_{pd}[(1)]	A or B	B or A			0.25	ns
t_{en}	$\overline{OE}$	A or B	1		8.9	ns
t_{dis}	OE	A or B	1		7.4	ns

(1) This 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).

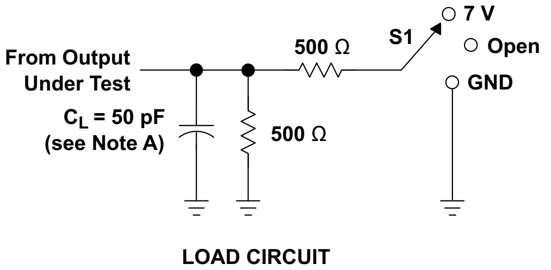
6.7 Typical Characteristics



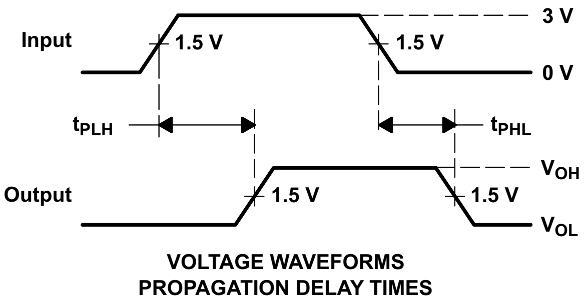
Note device variation mentioned in *Electrical Characteristics*

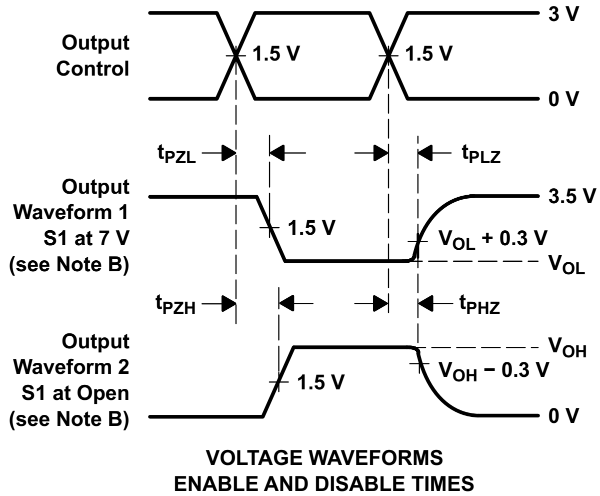
Figure 1. I_{CC} variation With Temperature

7 Parameter Measurement Information



TEST	S1
t_{pd}	Open
t_{PLZ}/t_{PZL}	7 V
t_{PHZ}/t_{PZH}	Open





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 ≤ 10 MHz, Z_O = 50 Ω, t_r ≤ 2.5 ns, t_f ≤ 2.5 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 2. Load Circuit and Voltage Waveforms

8 Detailed Description

8.1 Overview

The SN74CBT3244 has eight bits of high-speed TTL-compatible bus switching. The switches are grouped in the 2 groups of 4 bits each. Each group has output-enabled inputs to allow signals to pass between A and B ports. The signals can travel from A port to B port or vice versa.

The low ON-state resistance of the switch allows connections to be made with minimal propagation delay. The device is ideal for switching high speed digital signals between microprocessors and peripheral devices which is useful in test applications, measurement applications, and control boards for factory automation.

8.2 Functional Block Diagram

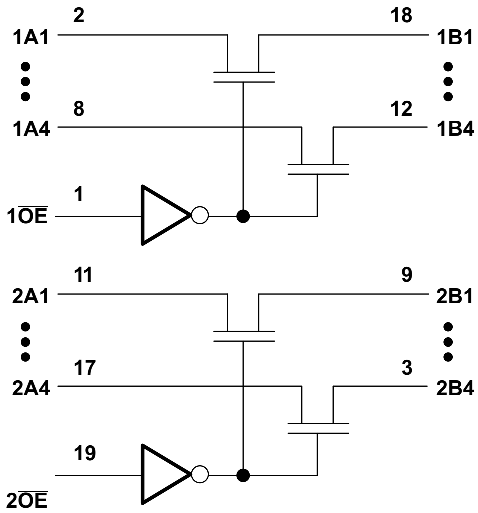


Figure 3. Simplified Schematic

8.3 Feature Description

The SN74CBT3244 device support same pin configuration as industry standard '244. This device has a near zero propagation delay allowing high speed signal switching up to 200 Mhz. The signals see lower distortion since the device has low ON-resistance (5 Ω) coupled with low-output capacitance (6 pF) . SN74CBT3244 has a very low power consumption in idle state consuming I_{CC} of 50 µA only allowing power-saving for the system. The device supports signal inputs any where between 0 V to 5 V.

8.4 Device Functional Modes

The device is organized as two 4-bit low-impedance switches with separate output-enable ($\overline{OE}$) inputs.The Output Enable $\overline{OE}$ is active low, implying when low A port is connected to B port. This switch is bidirectional in nature. Asserting $\overline{OE}$ high will disconnect A port from B port. 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.

Table 1. Function Table (Each 4-Bit Bus Switch)

INPUT $\overline{OE}$	FUNCTION
L	A port = B port
H	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 SN74CBT3244 device can be used to control up to 4 bits with 2 channels simultaneously. The application shown in Figure 4 is a 8-bit bus being controlled. The $\overline{OE}$ pins are used to control the chip from the bus controller. This is a generic example and can apply to many situations. If an application requires fewer than 8 bits, ensure that the A side is tied either high or low on unused channels.

9.2 Typical Application

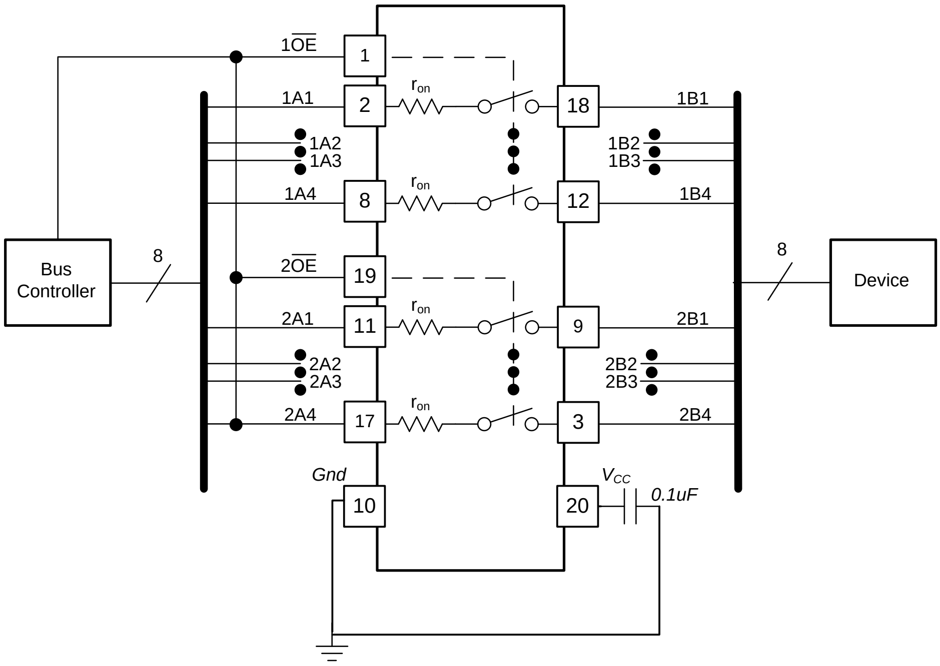


Figure 4. Typical Application

9.2.1 Design Requirements

A 0.1-µF bypass capacitor should be placed between each V_{CC} pin and GND. Each capacitor should be placed as close as possible to the SN74CBT3244 device.

9.2.2 Detailed Design Procedure

1. Recommended input conditions:
   - For specified high and low levels, see V_{IH} and V_{IL} in *Electrical Characteristics*
   - Inputs and outputs are overvoltage tolerant, which allows them to go as high as 5.5 V at any valid V_{CC}
2. Recommended output conditions:
   - Load currents must not exceed ±64 mA per channel
3. Frequency selection criterion:
   - Added trace resistance or capacitance can reduce maximum frequency capability; use layout practices as directed in *Layout Guidelines*

Typical Application (continued)

9.2.3 Application Curve

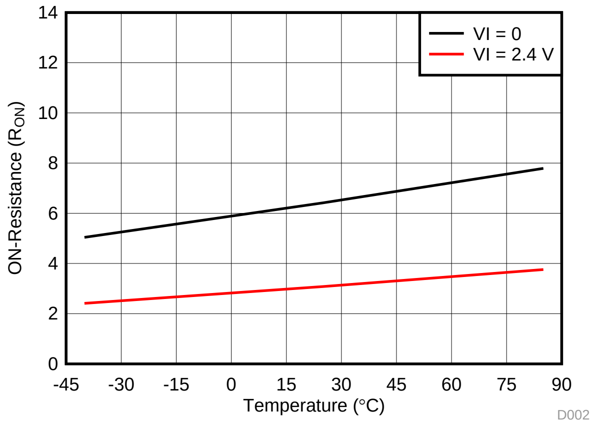


Figure 5. ON-Resistance (R_{on}) Variation vs Temperature

(1) Note device variation mentioned in *Electrical Characteristics*

10 Power Supply Recommendations

The power supply can be any voltage between the minimum and maximum supply voltage rating listed in the *Absolute Maximum Ratings* table.

Each V_{CC} terminal should have a good bypass capacitor to prevent power disturbance. For devices with a single supply, a 0.1-µF bypass capacitor is recommended. If multiple pins are labeled V_{CC}, then a 0.01-µF or 0.022-µF 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-µF 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 µF and 1 µF are commonly used in parallel. The bypass capacitor must 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; therefore, some traces must turn corners. Figure 6 shows progressively better techniques of rounding corners. Only the last example (BEST) maintains constant trace width and minimizes reflections.

11.2 Layout Example

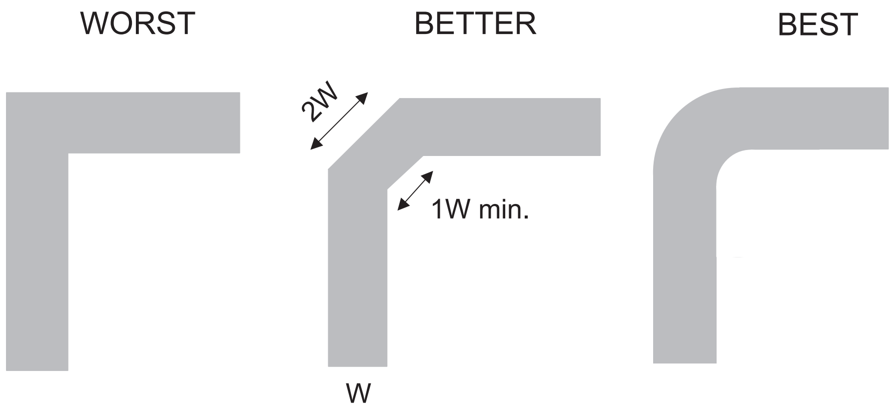


Figure 6. Trace Example

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 Community Resources

The following links connect to TI community resources. Linked contents are provided "AS IS" by the respective contributors. They do not constitute TI specifications and do not necessarily reflect TI's views; see TI's Terms of Use.

TI E2E™ Online Community ***TI's Engineer-to-Engineer (E2E) Community.*** Created to foster collaboration among engineers. At e2e.ti.com, you can ask questions, share knowledge, explore ideas and help solve problems with fellow engineers.

Design Support ***TI's Design Support*** Quickly find helpful E2E forums along with design support tools and contact information for technical support.

12.3 Trademarks

E2E is a trademark of Texas Instruments.
All other trademarks are the property of their respective owners.

12.4 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.

12.5 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
SN74CBT3244DBLE	OBSOLETE	SSOP	DB	20		TBD	Call TI	Call TI	-40 to 85		
SN74CBT3244DBQR	ACTIVE	SSOP	DBQ	20	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	-40 to 85	CBT3244	Samples
SN74CBT3244DBR	ACTIVE	SSOP	DB	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	CU244	Samples
SN74CBT3244DBRG4	ACTIVE	SSOP	DB	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	CU244	Samples
SN74CBT3244DGVR	ACTIVE	TVSOP	DGV	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	CU244	Samples
SN74CBT3244DW	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	CBT3244	Samples
SN74CBT3244DWR	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	CBT3244	Samples
SN74CBT3244PW	ACTIVE	TSSOP	PW	20	70	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	CU244	Samples
SN74CBT3244PWE4	ACTIVE	TSSOP	PW	20	70	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	CU244	Samples
SN74CBT3244PWLE	OBSOLETE	TSSOP	PW	20		TBD	Call TI	Call TI	-40 to 85		
SN74CBT3244PWR	ACTIVE	TSSOP	PW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	CU244	Samples
SN74CBT3244PWRE4	ACTIVE	TSSOP	PW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	CU244	Samples
SN74CBT3244PWRG4	ACTIVE	TSSOP	PW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	CU244	Samples
SN74CBT3244RGYR	ACTIVE	VQFN	RGY	20	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	-40 to 85	CU244	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.

[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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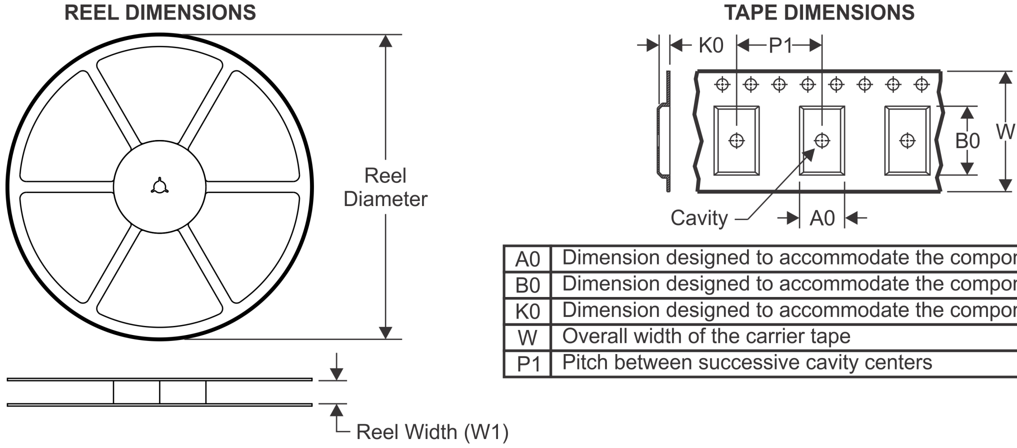
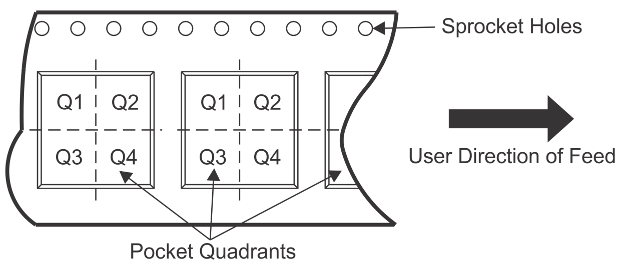
TAPE AND REEL INFORMATION



A0	Dimension designed to accommodate the component width
B0	Dimension designed to accommodate the component length
K0	Dimension designed to accommodate the component thickness
W	Overall width of the carrier tape
P1	Pitch between successive cavity centers

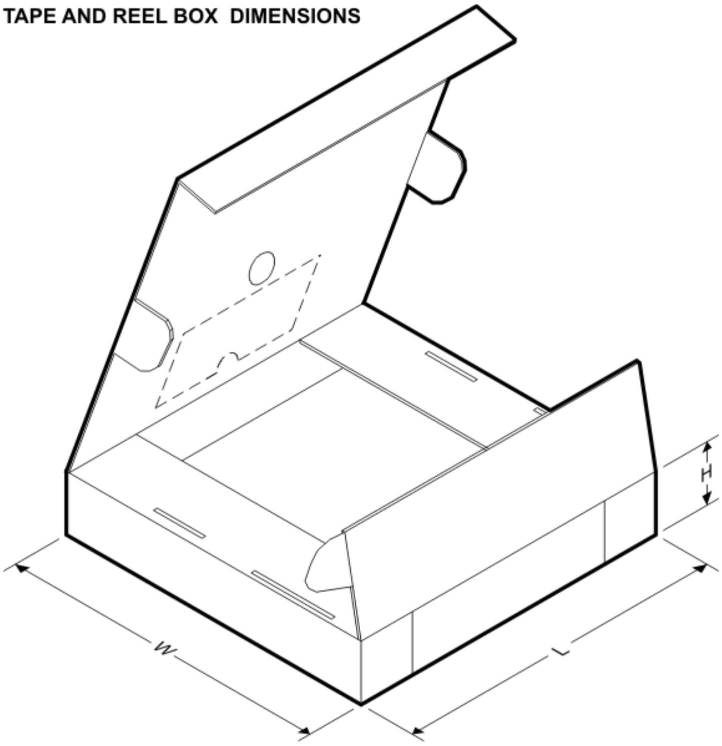
QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*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
SN74CBT3244DBQR	SSOP	DBQ	20	2500	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1
SN74CBT3244DBR	SSOP	DB	20	2000	330.0	16.4	8.2	7.5	2.5	12.0	16.0	Q1
SN74CBT3244DGVR	TVSOP	DGV	20	2000	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1
SN74CBT3244DWR	SOIC	DW	20	2000	330.0	24.4	10.8	13.3	2.7	12.0	24.0	Q1
SN74CBT3244PWR	TSSOP	PW	20	2000	330.0	16.4	6.95	7.1	1.6	8.0	16.0	Q1
SN74CBT3244RGYR	VQFN	RGY	20	3000	330.0	12.4	3.8	4.8	1.6	8.0	12.0	Q1

TAPE AND REEL BOX DIMENSIONS

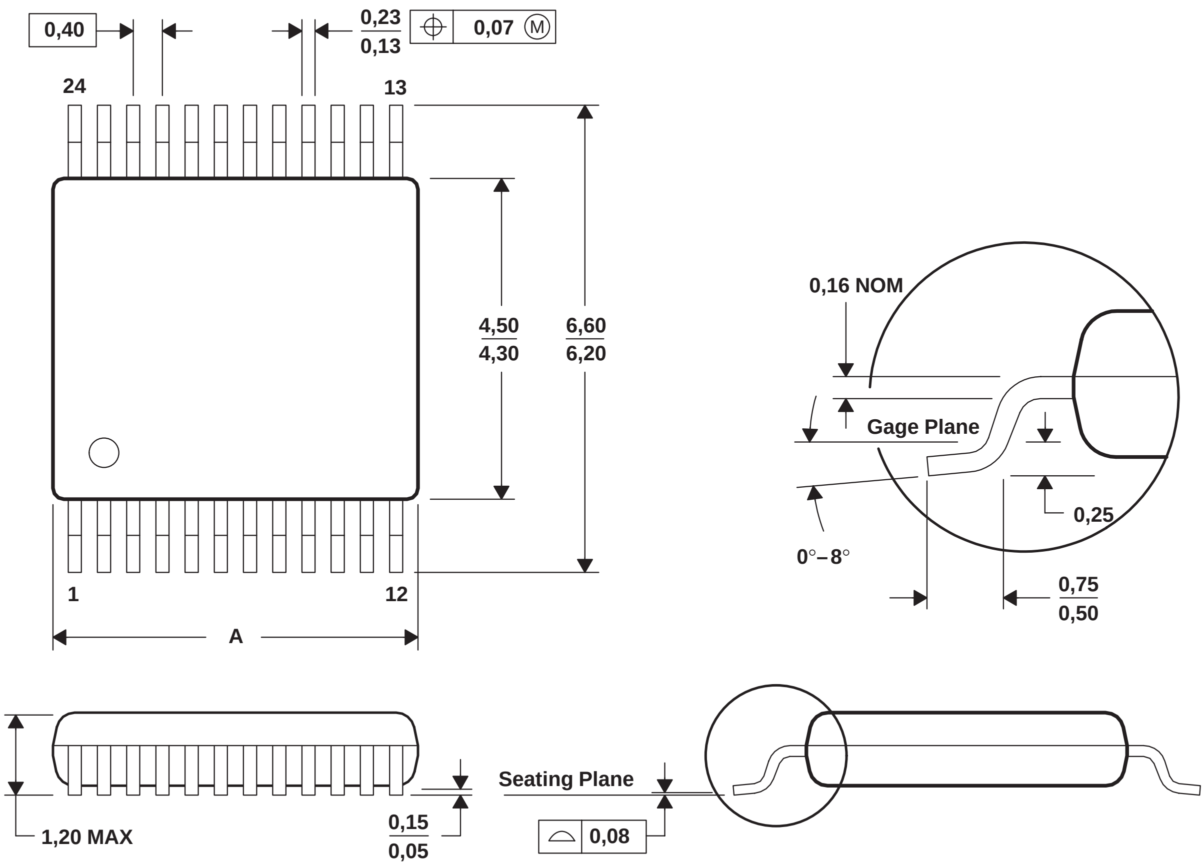


*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74CBT3244DBQR	SSOP	DBQ	20	2500	367.0	367.0	38.0
SN74CBT3244DBR	SSOP	DB	20	2000	367.0	367.0	38.0
SN74CBT3244DGVR	TVSOP	DGV	20	2000	367.0	367.0	35.0
SN74CBT3244DWR	SOIC	DW	20	2000	367.0	367.0	45.0
SN74CBT3244PWR	TSSOP	PW	20	2000	367.0	367.0	38.0
SN74CBT3244RGYR	VQFN	RGY	20	3000	367.0	367.0	35.0

DGV (R-PDSO-G)** **PLASTIC SMALL-OUTLINE**

24 PINS SHOWN



PINS ** / DIM	14	16	20	24	38	48	56
A MAX	3,70	3,70	5,10	5,10	7,90	9,80	11,40
A MIN	3,50	3,50	4,90	4,90	7,70	9,60	11,20

4073251/E 08/00

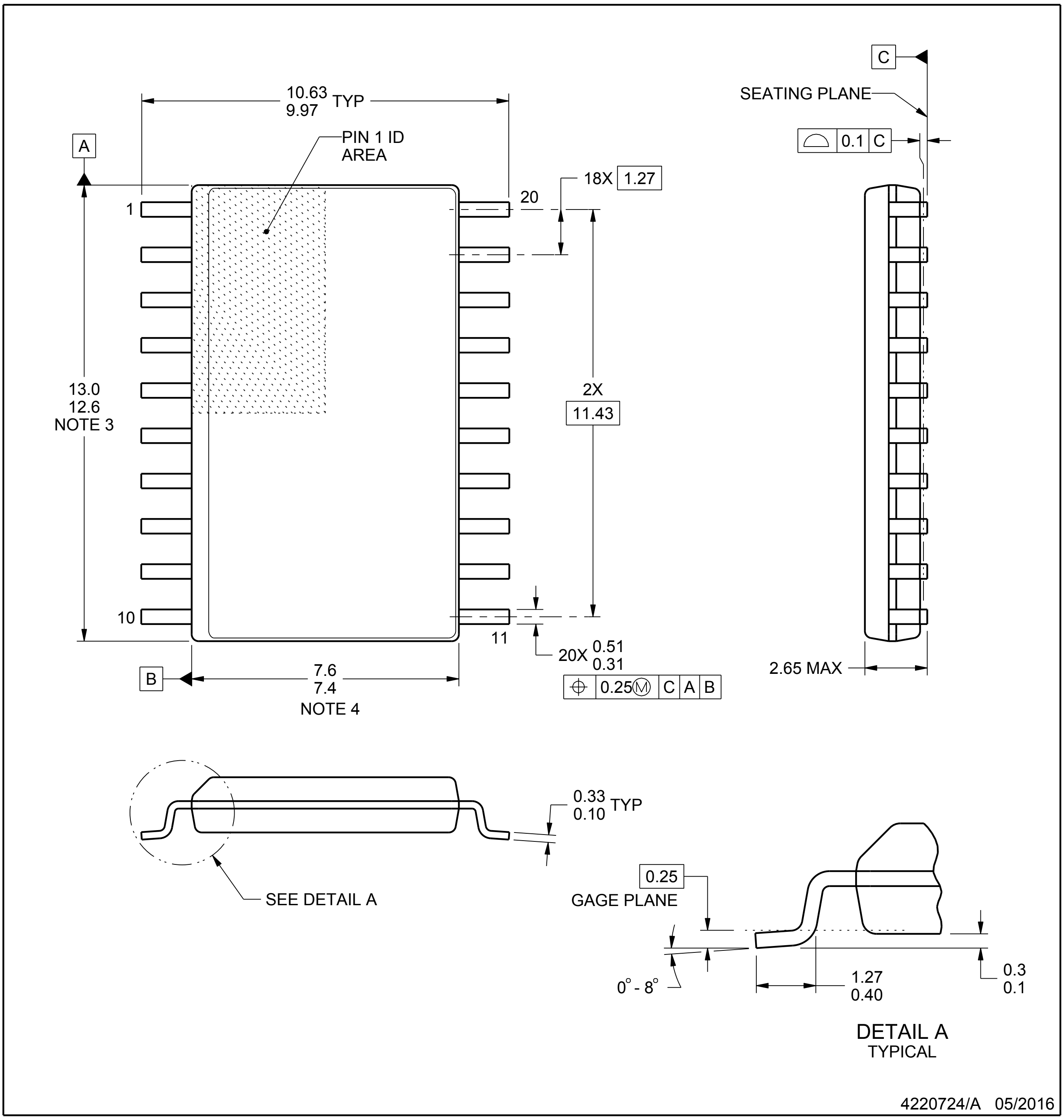
NOTES: A. All linear dimensions are in millimeters.
B. This drawing is subject to change without notice.
C. Body dimensions do not include mold flash or protrusion, not to exceed 0,15 per side.
D. Falls within JEDEC: 24/48 Pins – MO-153
14/16/20/56 Pins – MO-194

PACKAGE OUTLINE

DW0020A

SOIC - 2.65 mm max height

SOIC



NOTES:

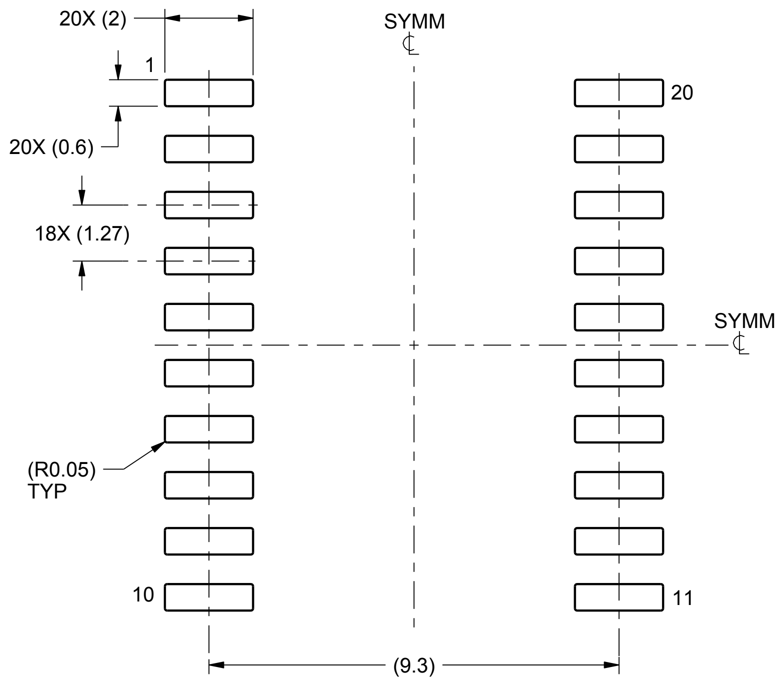
1. All linear dimensions are in millimeters. Dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 mm per side.
4. This dimension does not include interlead flash. Interlead flash shall not exceed 0.43 mm per side.
5. Reference JEDEC registration MS-013.

EXAMPLE BOARD LAYOUT

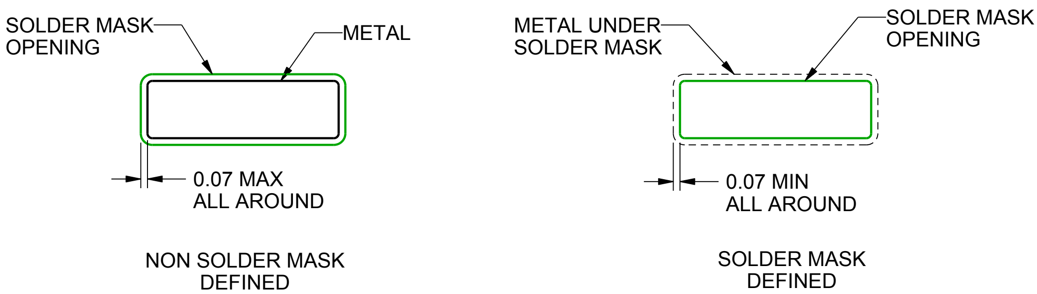
DW0020A

SOIC - 2.65 mm max height

SOIC



LAND PATTERN EXAMPLE
SCALE:6X



SOLDER MASK DETAILS

4220724/A 05/2016

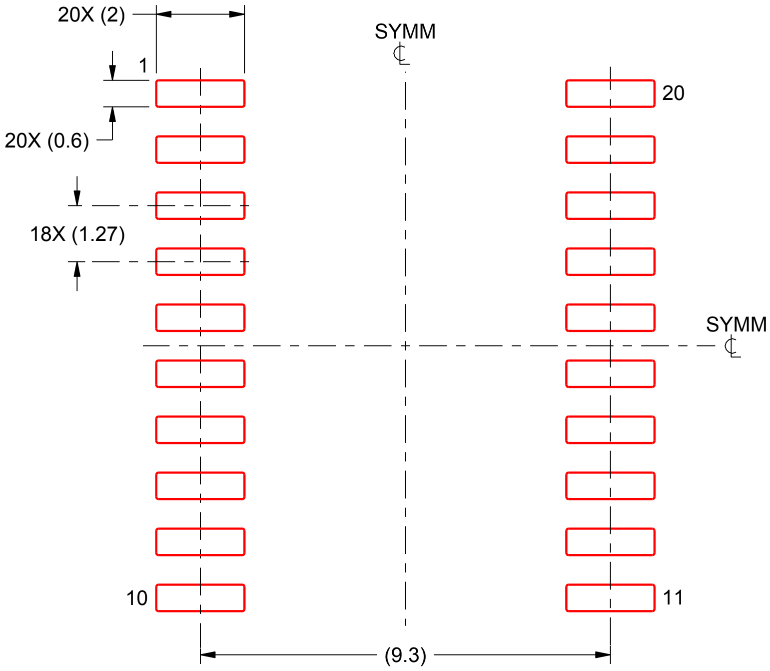
NOTES: (continued)

6. Publication IPC-7351 may have alternate designs.
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

EXAMPLE STENCIL DESIGN

DW0020A SOIC - 2.65 mm max height

SOIC



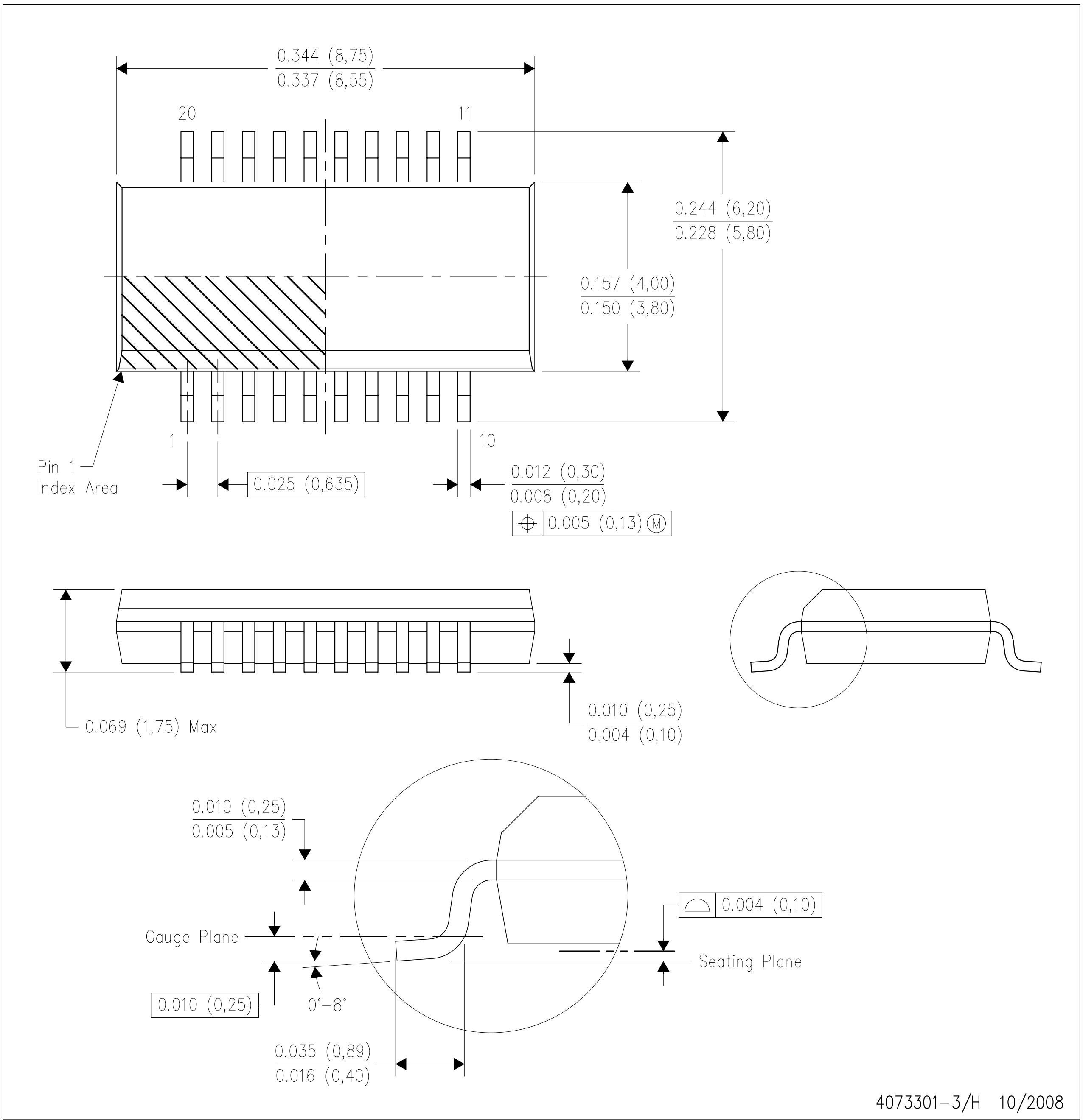
SOLDER PASTE EXAMPLE
BASED ON 0.125 mm THICK STENCIL
SCALE:6X

4220724/A 05/2016

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.

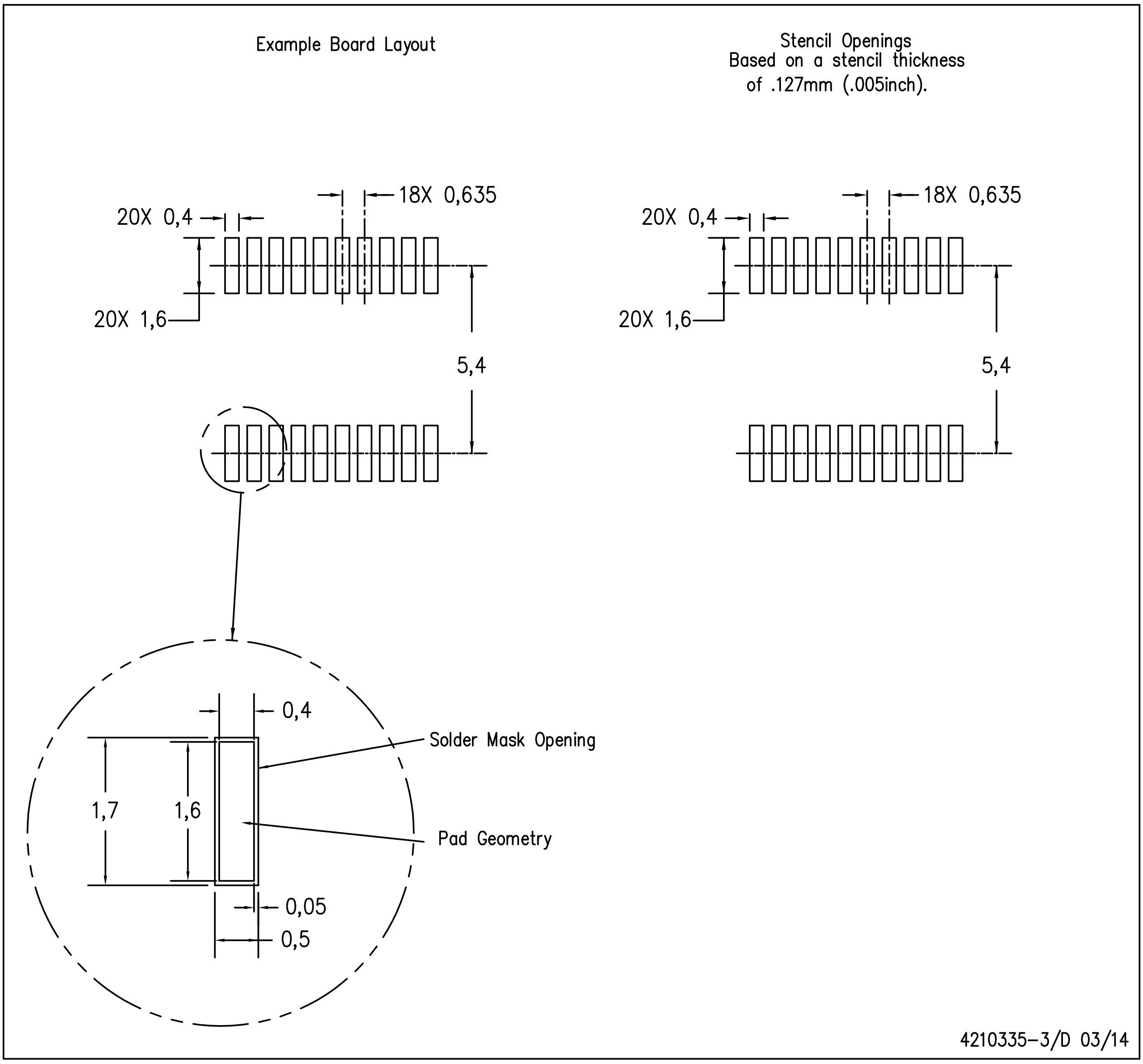
DBQ (R–PDSO–G20) PLASTIC SMALL–OUTLINE PACKAGE



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 AD.

LAND PATTERN DATA

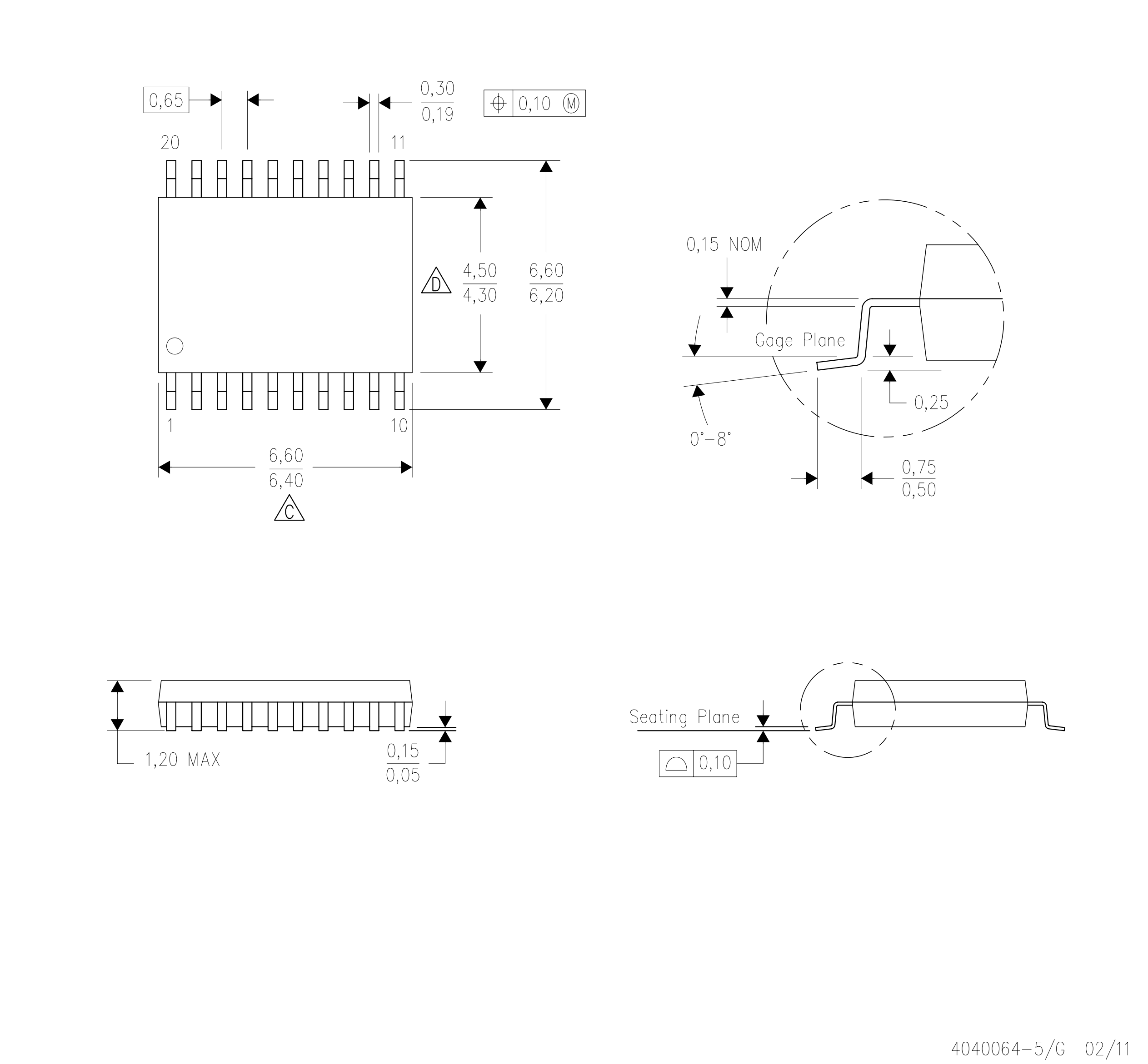
DBQ (R–PDSO–G20) PLASTIC SMALL OUTLINE PACKAGE



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.

MECHANICAL DATA

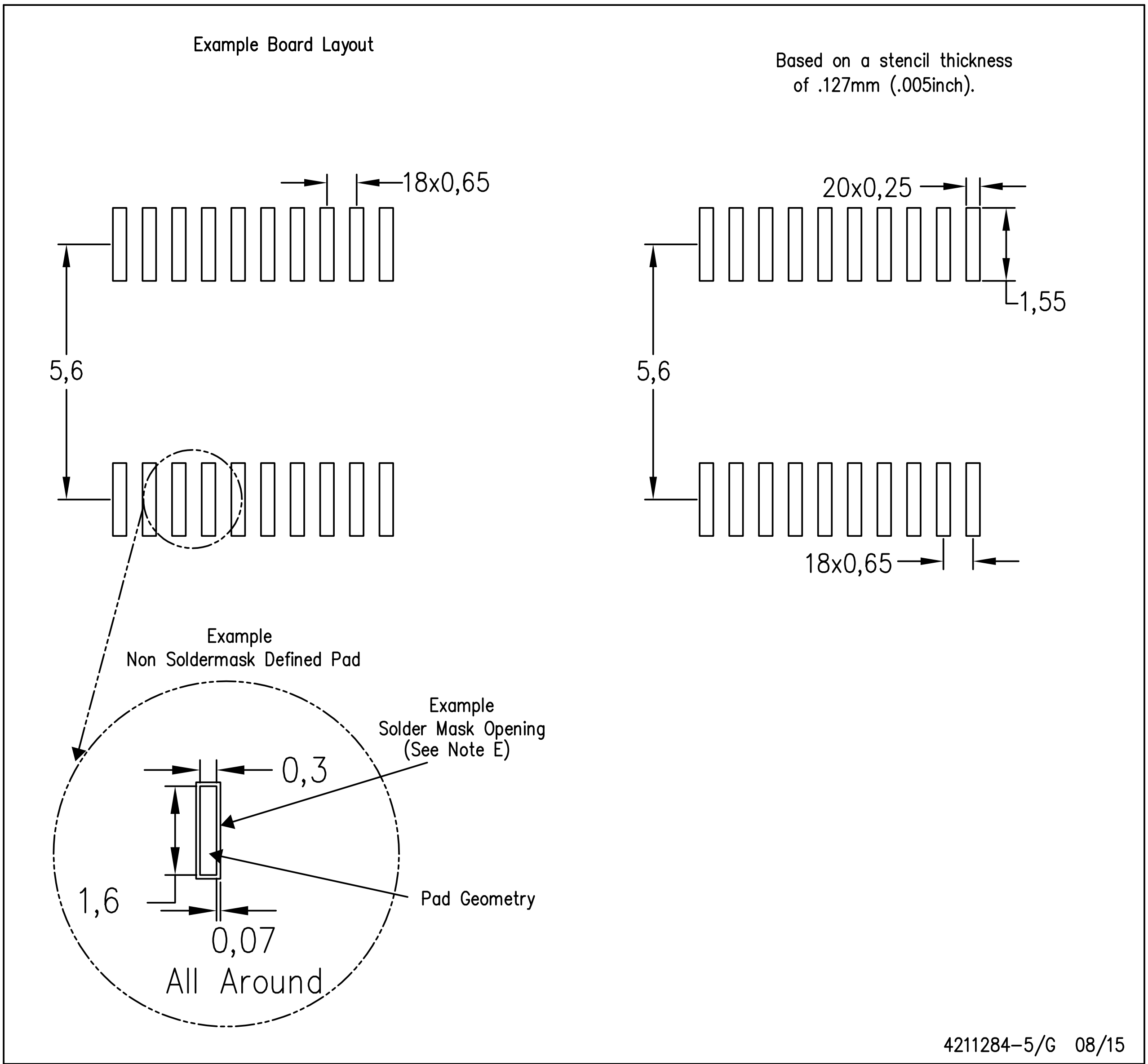
PW (R–PDSO–G20) PLASTIC SMALL OUTLINE



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

LAND PATTERN DATA

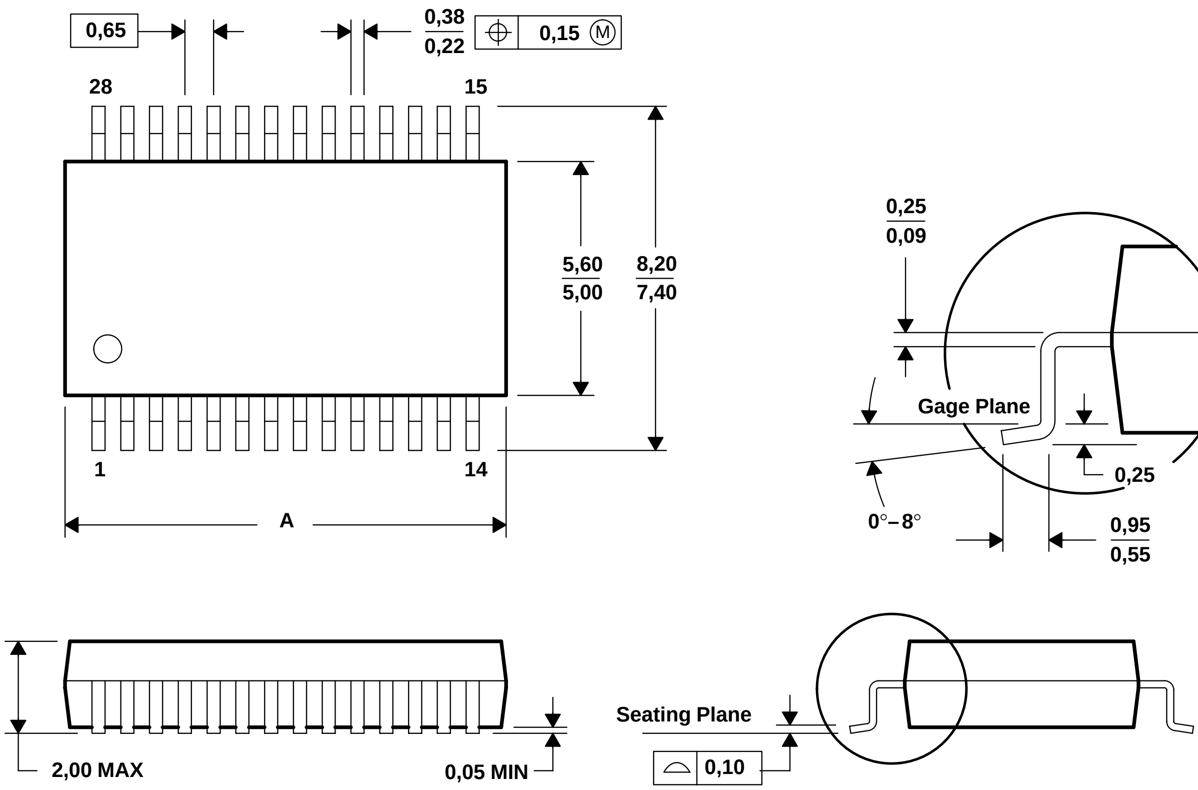
PW (R–PDSO–G20) PLASTIC SMALL OUTLINE



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 design.
- 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.

DB (R-PDSO-G)** **PLASTIC SMALL-OUTLINE**

28 PINS SHOWN



PINS ** / DIM	14	16	20	24	28	30	38
A MAX	6,50	6,50	7,50	8,50	10,50	10,50	12,90
A MIN	5,90	5,90	6,90	7,90	9,90	9,90	12,30

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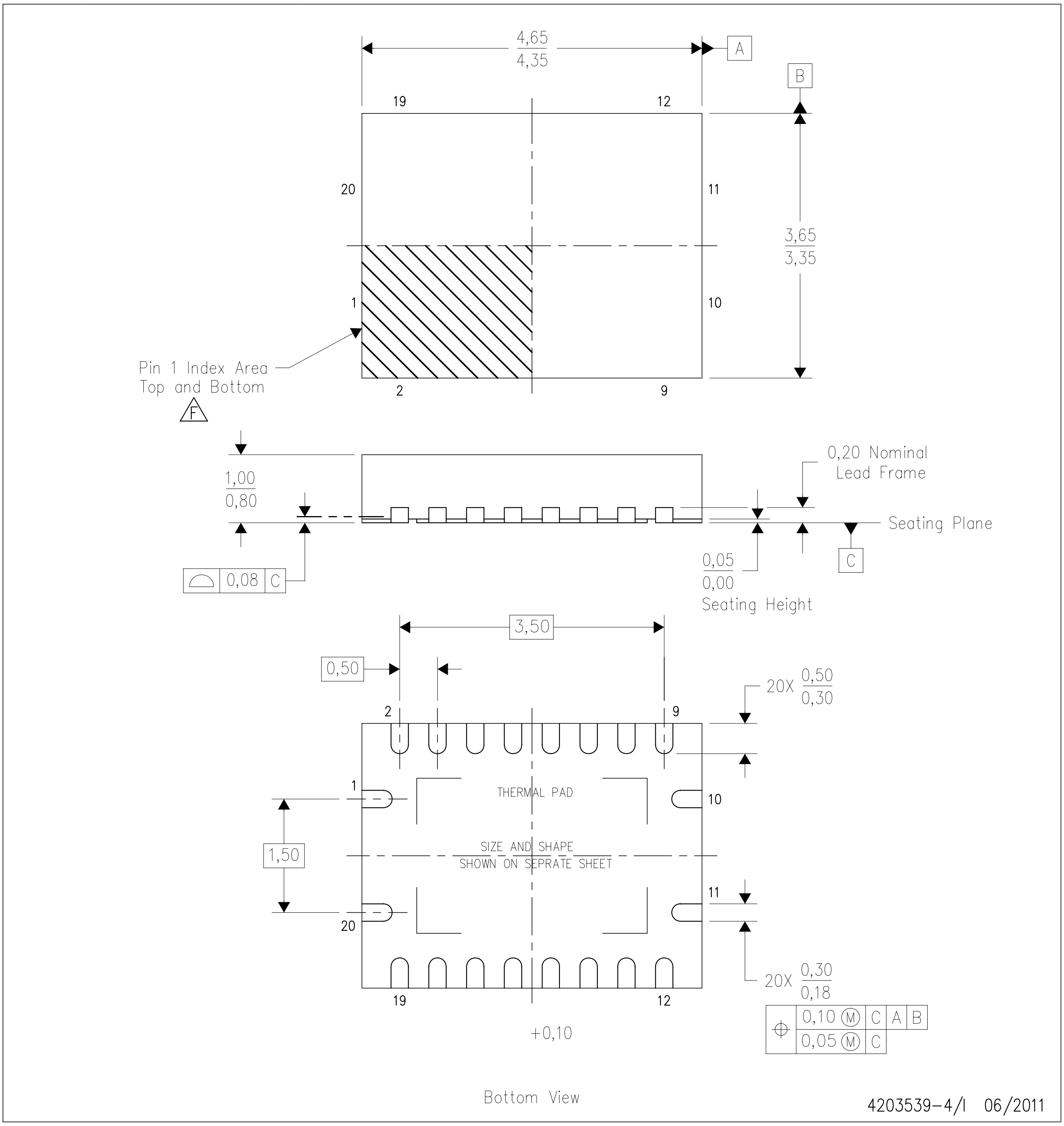
NOTES: A. All linear dimensions are in millimeters.
B. This drawing is subject to change without notice.
C. Body dimensions do not include mold flash or protrusion not to exceed 0,15.
D. Falls within JEDEC MO-150

MECHANICAL DATA

RGY (R-PVQFN-N20) 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.

THERMAL PAD MECHANICAL DATA

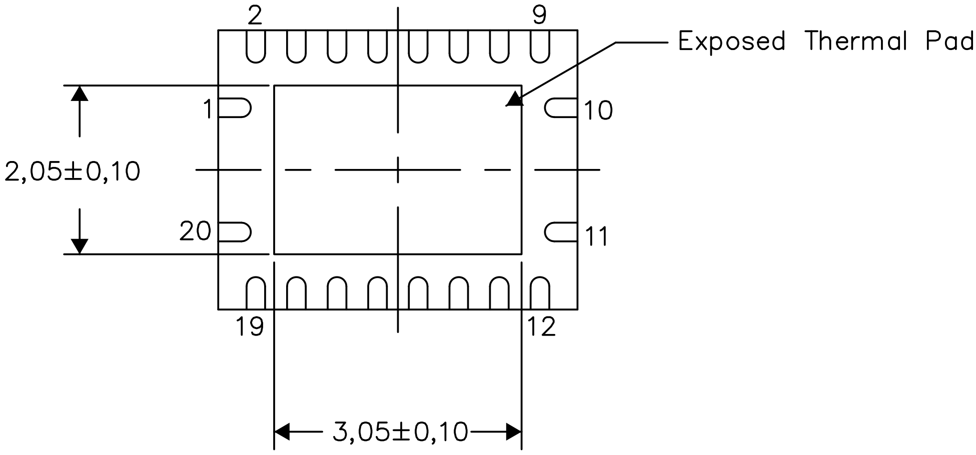
RGY (R-PVQFN-N20) PLASTIC QUAD FLATPACK NO-LEAD

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.

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



Bottom View

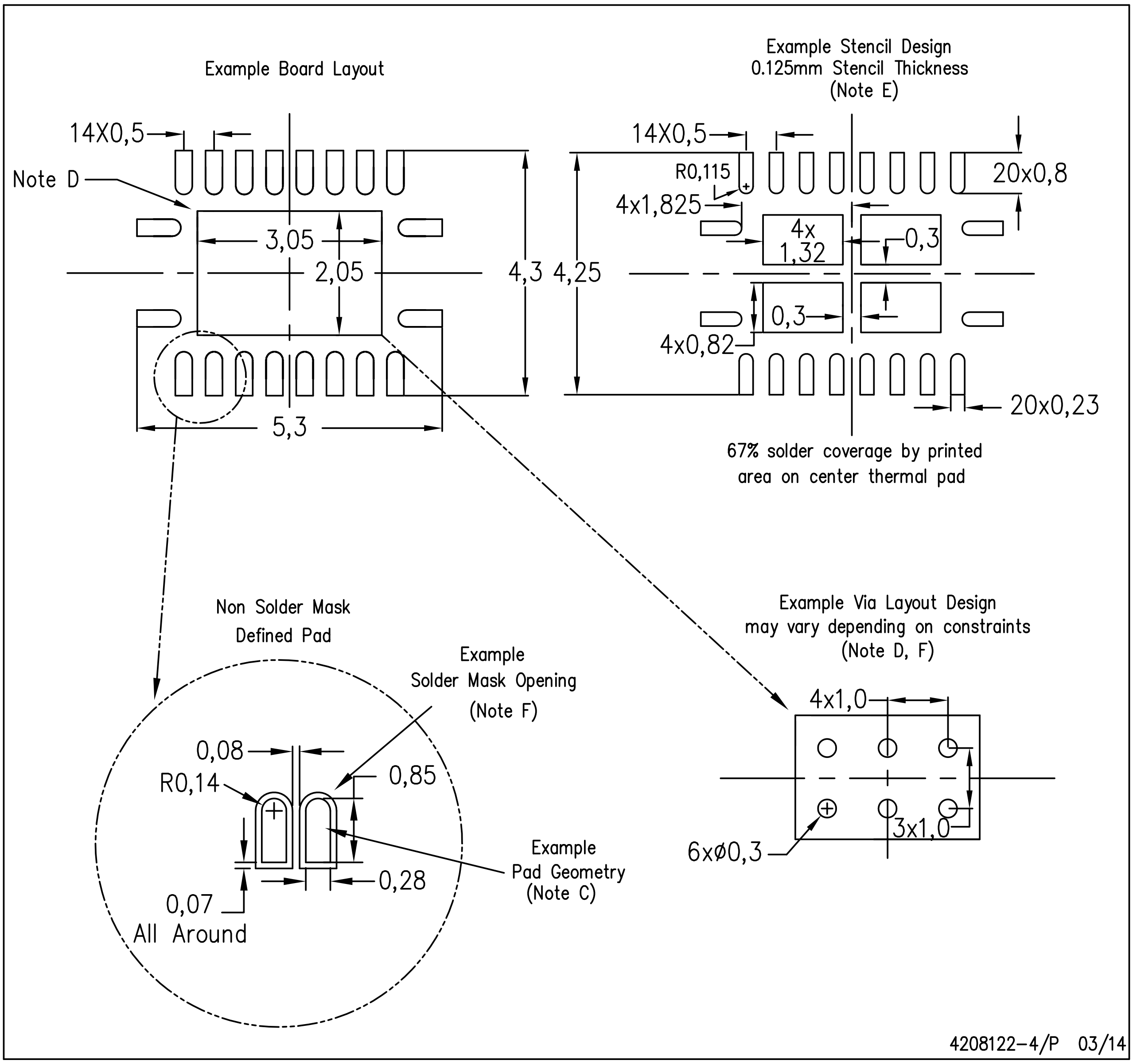
Exposed Thermal Pad Dimensions

4206353-4/P 03/14

NOTE: All linear dimensions are in millimeters

LAND PATTERN DATA

RGY (R-PVQFN-N20) 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. 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>.
- 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.

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