

BQ25180 I²C Controlled, 1-Cell, 1-A Linear Battery Charger with Power Path and Ship Mode

1 Features

- 1-A linear battery charger
 - 3.0-V to 5.9-V input voltage operating range optimized for battery to battery charging and USB adapter
 - 25-V tolerant input voltage
 - Configurable battery regulation voltage with 0.5% accuracy from 3.6 V to 4.65 V in 10-mV steps
 - Li-ion and LiFePO₄ chemistries support
 - 5-mA to 1-A configurable fast charge current
 - 70-mΩ battery FET ON resistance
 - Up to 2.5-A discharge current to support high system loads
 - Configurable termination current down to 0.5 mA
 - Configurable NTC charging profile thresholds including JEITA support
 - Power cycle and advanced reset mechanism
 - I²C or standalone versions available
- Power path management for powering the system and charging the battery
 - Regulated system voltage (SYS) ranging from 4.4 V to 4.9 V in addition to battery voltage tracking and input pass-through options
 - Configurable input current limit
 - USB Suspend mode supported
 - Dynamic power path management optimizes charging from weak adapters
- Ultra low quiescent current
 - 10-nA Shutdown mode
 - 5-μA Ship mode with button press wake
 - 3 μA in Battery Only mode
 - 500-μA input I_q when charge is disabled/terminated
- One push-button wake-up and reset input
- Integrated fault protection
 - Input overvoltage protection (VIN_OVP)
 - Battery undervoltage protection (BUVLO)
 - Battery short protection (BATSC)
 - Battery overcurrent protection (BATOCP)
 - Input current limit protection (ILIM)
 - Thermal regulation (TREG) and thermal shutdown (TSHUT)
 - Battery thermal fault protection (TS)
 - Watchdog and safety timer fault

2 Applications

- [TWS headset and charging case](#)
- [Smart glasses, AR and VR](#)
- [Smart watches and other wearable devices](#)
- [Retail automation and payment](#)
- [Building automation](#)

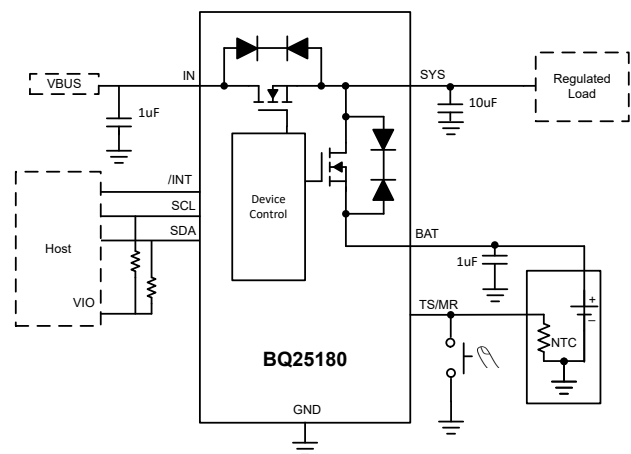
3 Description

The BQ25180 is a linear battery charger IC focusing on small solution size and low quiescent current for extending battery life. The device is available in an 8-ball chipscale package which does not need HDI PCB process for fabrication thereby reducing the PCB cost. The device can support up to 1-A charging and system loads of up to 2.5 A.

Device Information

PART NUMBER	PACKAGE ⁽¹⁾	BODY SIZE (NOM)
BQ25180	DSBGA (8)	1.6 mm x 1.1 mm

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



Simplified Schematic

4 Description (continued)

The battery is charged using a standard Li-ion or LiFePO₄ charge profile with three phases: precharge, constant current and constant voltage. Thermal regulation provides the maximum charge current while managing the device temperature. The charger is also optimized for battery to battery charging with 3-V minimum input voltage operation and can withstand 25-V absolute maximum line transients. The device integrates a single push-button input and reset circuitry to reduce the total solution footprint.

5 Device and Documentation Support

5.1 Device Support

5.1.1 Third-Party Products Disclaimer

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5.2 Receiving Notification of Documentation Updates

To receive notification of documentation updates, navigate to the device product folder on ti.com. Click on *Subscribe to updates* to register and receive a weekly digest of any product information that has changed. For change details, review the revision history included in any revised document.

5.3 Support Resources

[TI E2E™ support forums](#) are an engineer's go-to source for fast, verified answers and design help — straight from the experts. Search existing answers or ask your own question to get the quick design help you need.

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5.5 Electrostatic Discharge Caution



This integrated circuit can be damaged by ESD. Texas Instruments recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage.

ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

5.6 Glossary

[TI Glossary](#) This glossary lists and explains terms, acronyms, and definitions.

6 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.

ADVANCE INFORMATION

6.1 Package Option Addendum

Packaging Information

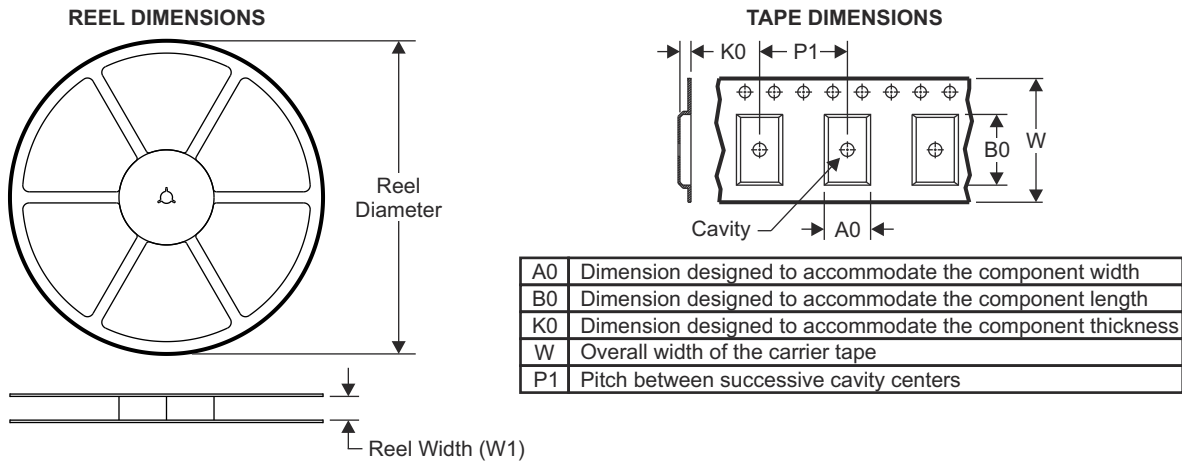
Orderable Device	Status ⁽¹⁾	Package Type	Package Drawing	Pins	Package Qty	Eco Plan ⁽²⁾	Lead/Ball Finish ⁽⁶⁾	MSL Peak Temp ⁽³⁾	Op Temp (°C)	Device Marking ^{(4) (5)}
PQ25180YBGR	PREVIEW	DSBGA	YBG	8	3000	RoHS & Green	SNAGCU	Level-1-260C-UNLIM	-40 to 125	
PQ25180YBGT	PREVIEW	DSBGA	YBG	8	250	RoHS & Green	SNAGCU	Level-1-260C-UNLIM	-40 to 125	

- (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.
PRE_PROD Unannounced device, not in production, not available for mass market, nor on the web, samples not available.
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 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.

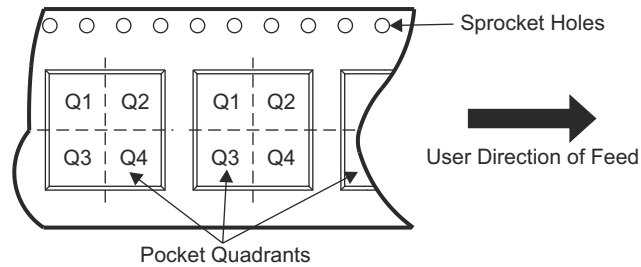
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6.2 Tape and Reel Information

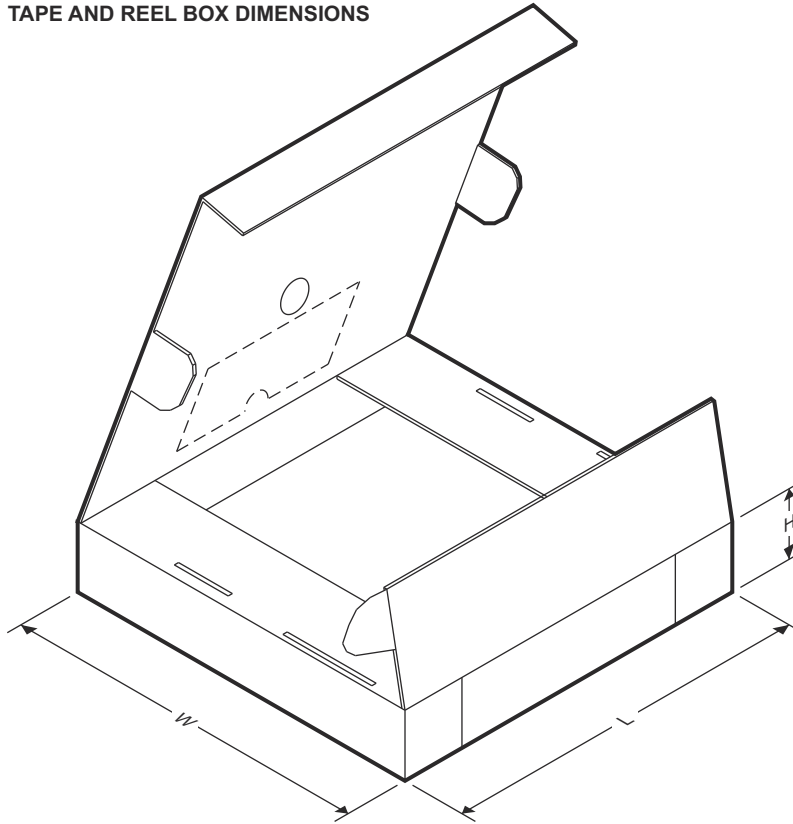


QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



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
PQ25180YBGR	DSBGA	YBG	8	3000	180.0	8.4	1.15	1.75	0.65	4.0	8.0	Q1
PQ25180YBGT	DSBGA	YBG	8	250	180.0	8.4	1.15	1.75	0.65	4.0	8.0	Q1

TAPE AND REEL BOX DIMENSIONS

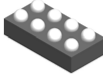


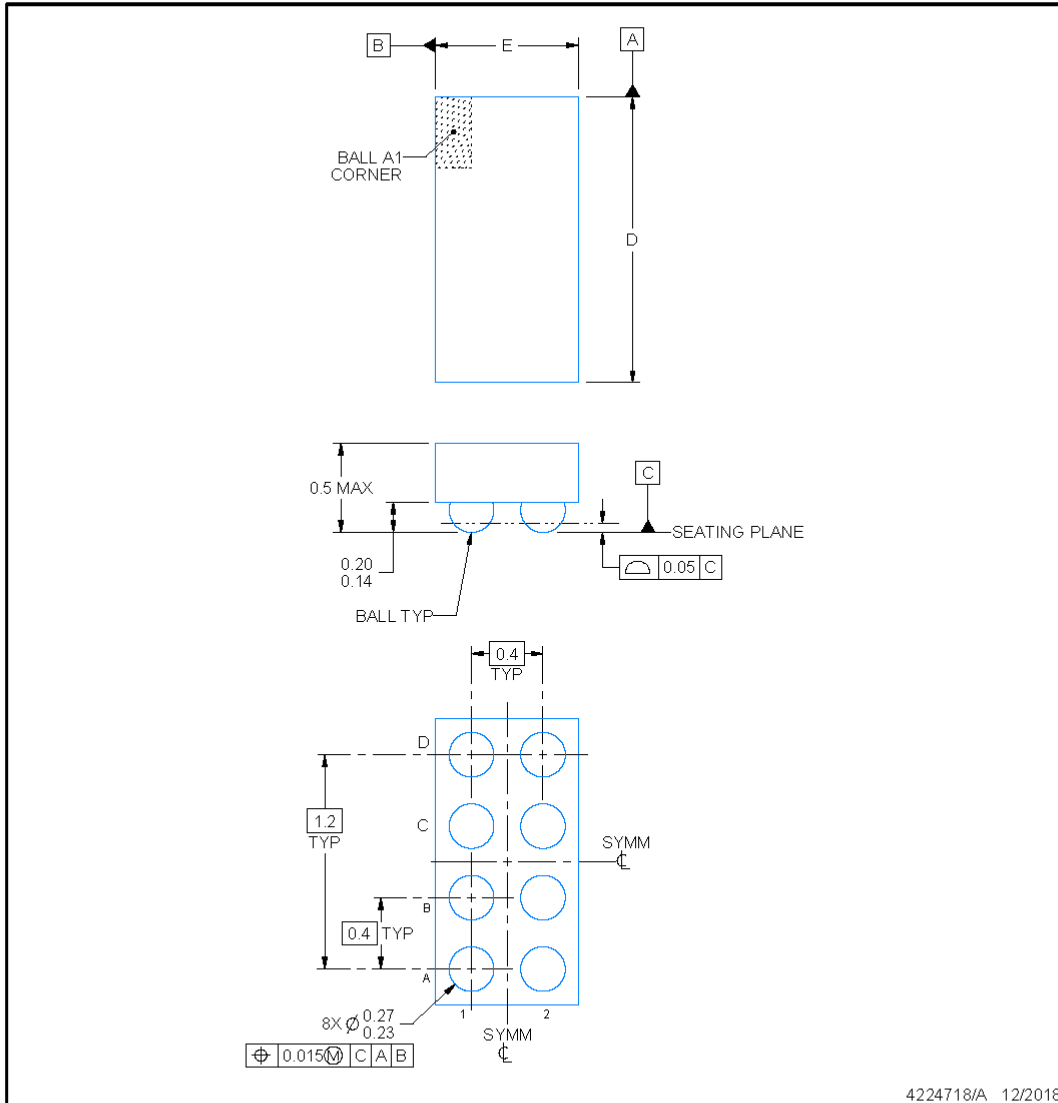
Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
PQ25180YBGR	DSBGA	YBG	8	3000	182.0	182.0	20.0
PQ25180YBGT	DSBGA	YBG	8	250	182.0	182.0	20.0

ADVANCE INFORMATION

6.3 Mechanical Data

ADVANCE INFORMATION

YBG0008  **PACKAGE OUTLINE**
DSBGA - 0.5 mm max height
 DIE SIZE BALL GRID ARRAY



NOTES:

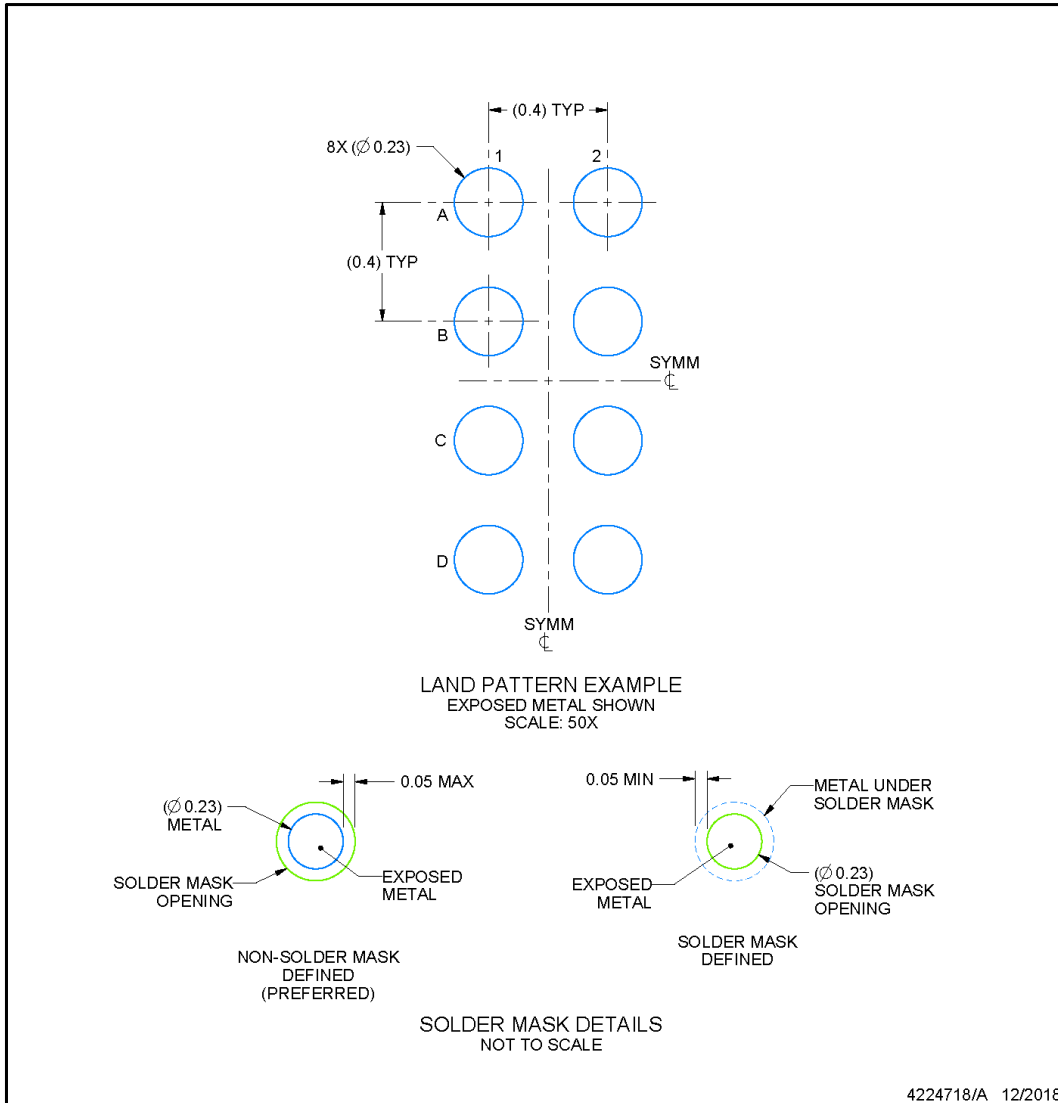
1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.

EXAMPLE BOARD LAYOUT

YBG0008

DSBGA - 0.5 mm max height

DIE SIZE BALL GRID ARRAY



NOTES: (continued)

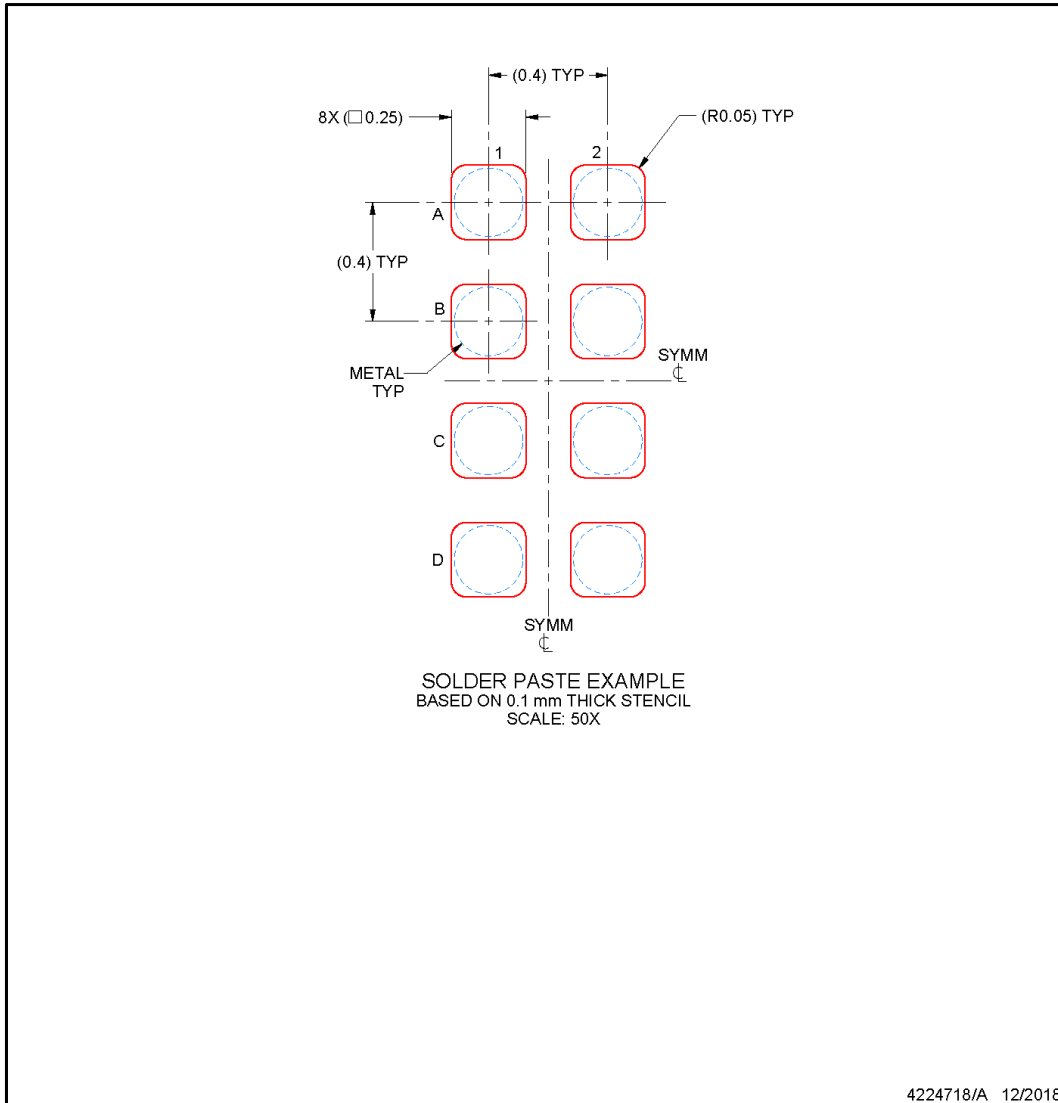
- Final dimensions may vary due to manufacturing tolerance considerations and also routing constraints. See Texas Instruments Literature No. SNVA009 (www.ti.com/lit/snva009).

EXAMPLE STENCIL DESIGN

YBG0008

DSBGA - 0.5 mm max height

DIE SIZE BALL GRID ARRAY



NOTES: (continued)

- 4. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release.

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