# 具有电源路径管理的 2A 单输入 I²C，独立开关模式锂离子电池充电器

查询样品: **bq24250**, **bq24251**, **bq24253**

## 特性

- 高效 **3MHz** 开关模式
- 与 **USB 2.0** 和 **USB 3.0** 充电标准兼容
  - **100mA**，**500mA** 或 **900mA** 的可选输入电流限值
- 具有无电电池支持的 **BC1.2** 兼容 **D+**，**D-** 检测
- **I²C™** 可编程性：
  - 电池充电电压 **(VREG)**
  - 电池充电电流 **(ICHG)**
  - 输入电流限制 **(ILIM)**
  - 输入电压调节 **(VDPM)**
  - 输入过压保护 **(OVP)**
  - 电池终止电流 **(ITERM)**
  - 充电时间 **(TMR)**
- 外部可编程缺省值：
  - 电池充电电流 **(ICHG)**
  - 输入电流限制 **(ILIM)**
  - 输入电压调节 **(VDPM)**
- 集成 **4.9V**，**50mA** 低压降稳压器 **(LDO)**
- 混合 **SMPS** 控制架构
  - 针对输出瞬态响应进行了优化
  - 电池电压和电流调节上的高精度
  - 充电时间优化器：快速恒流 **(CC)** 至恒压 **(CV)** 过渡
- **20V** 额定最大输入电压
- **10.5V** 最大运行输入电压
- 针对高达 **2A** 充电率的低 $R_{DS（接通）}$ 集成功率场效应晶体管 **(FET)**
- 开漏状态输出
- ***AnyBoot***稳健耐用电池检测算法
- 锂离子、锂聚合物、或磷酸铁锂 **(LiFePO4)** 化学电池
- 微型晶圆级芯片 **(WCSP)** 和四方扁平无引线 **(QFN)** 封装

## 应用范围

- 移动电话, 智能电话
- **MP3** 播放器
- 数码相机
- 便携式手持器件
- 多媒体播放器

## 说明

bq2425x 系列是高度集成的单节锂离子电池充电器和系统电源路径管理器件，这些器件主要是针对空间有限且含有高容量电池的便携式应用。 单节充电器有一个由 USB 端口或 AC 墙式适配器供电运行（电压高达 10.5V）的单一输入以提供多用途解决方案。 此电源路径管理特性使得 bq2425x 能够在对电池进行独立充电的同时从一个高效恒定频率直流 (DC) 到 DC 转换器为系统供电。 此充电器一直监视电池电流并在系统负载所需电流高于输入电流限值时减少充电电流。 这将实现正常的充电终止并且使得系统能够与残次品或者缺失电池组一起运行。 此外，这将在使用完全放电电池或者没有电池时实现瞬时系统启动。 当此适配器不能传送此峰值系统电流时，此电源路径管理架构允许电池补充系统电流需要。 这样可使用较小的适配器。 电池充电分为四个阶段：涓流充电、预充电、恒定电流和恒定电压。 在所有的充电阶段，一个内部控制环路监视 IC 结温并且在超过内部温度阀值的情况下减少充电电流。 完全兼容的 BC1.2 D+，D- 检测使系统能够更加容易地符合最新的 USB 充电标准。 都在一个微型 WCSP 或 QFN 封装内 [(1)]

(1) 产品细节和设计资源请访问ti.com/batterymanagement

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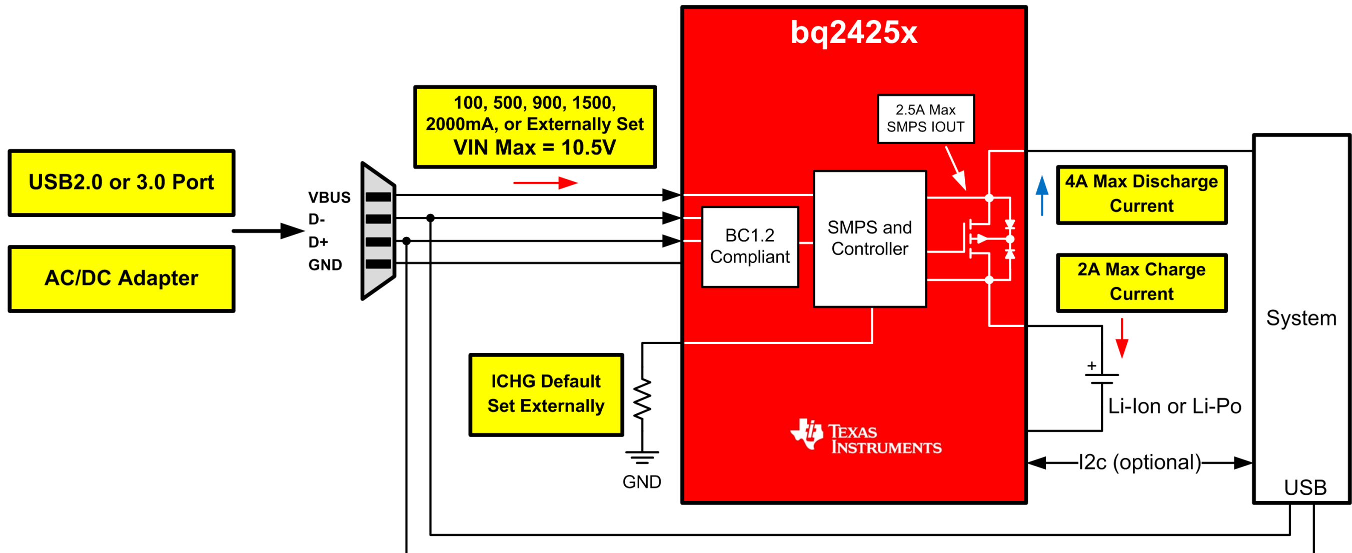
English Data Sheet: SLUSBA1

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.

方框图





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## 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| BQ24250RGER | ACTIVE | VQFN | RGE | 24 | 3000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR | | BQ24250 | Samples |
| BQ24250RGET | ACTIVE | VQFN | RGE | 24 | 250 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR | | BQ24250 | Samples |
| BQ24250YFFR | ACTIVE | DSBGA | YFF | 30 | 3000 | Green (RoHS & no Sb/Br) | SNAGCU | Level-1-260C-UNLIM | -40 to 85 | BQ24250 | Samples |
| BQ24250YFFT | ACTIVE | DSBGA | YFF | 30 | 250 | Green (RoHS & no Sb/Br) | SNAGCU | Level-1-260C-UNLIM | -40 to 85 | BQ24250 | Samples |
| BQ24251RGER | NRND | VQFN | RGE | 24 | 3000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR | -40 to 85 | BQ24251 | |
| BQ24251RGET | NRND | VQFN | RGE | 24 | 250 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR | -40 to 85 | BQ24251 | |
| BQ24251YFFR | NRND | DSBGA | YFF | 30 | 3000 | Green (RoHS & no Sb/Br) | SNAGCU | Level-1-260C-UNLIM | -40 to 85 | BQ24251 | |
| BQ24251YFFT | NRND | DSBGA | YFF | 30 | 250 | Green (RoHS & no Sb/Br) | SNAGCU | Level-1-260C-UNLIM | -40 to 85 | BQ24251 | |
| BQ24253RGER | ACTIVE | VQFN | RGE | 24 | 3000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR | -40 to 85 | BQ24253 | Samples |
| BQ24253RGET | ACTIVE | VQFN | RGE | 24 | 250 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR | -40 to 85 | BQ24253 | Samples |
| BQ24253YFFR | ACTIVE | DSBGA | YFF | 30 | 3000 | Green (RoHS & no Sb/Br) | SNAGCU | Level-1-260C-UNLIM | -40 to 85 | BQ24253 | Samples |
| BQ24253YFFT | ACTIVE | DSBGA | YFF | 30 | 250 | Green (RoHS & no Sb/Br) | SNAGCU | Level-1-260C-UNLIM | -40 to 85 | BQ24253 | 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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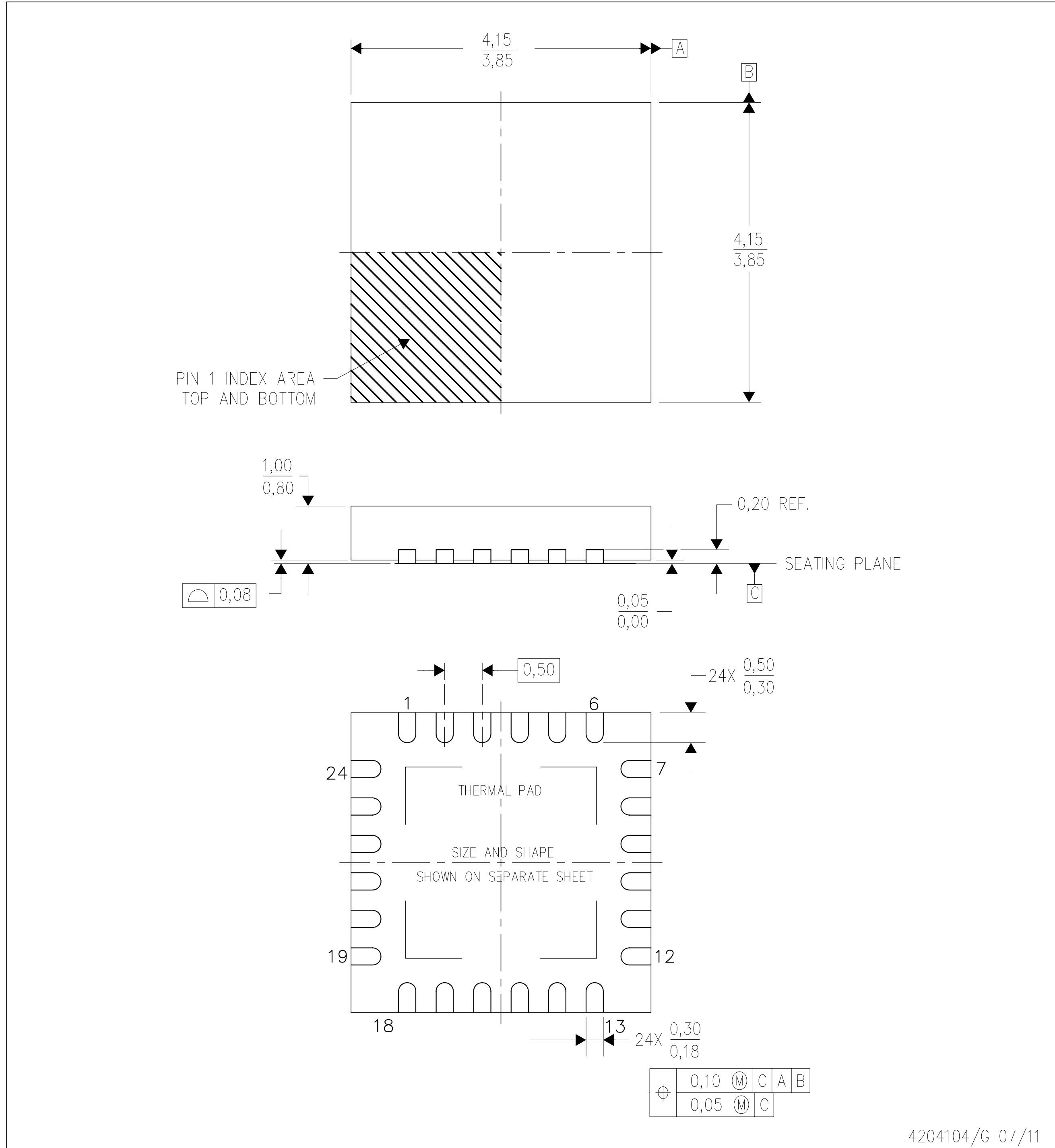
RGE (S-PVQFN-N24) PLASTIC QUAD FLATPACK NO-LEAD




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. Quad Flatpack, No–Leads (QFN) 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. Falls within JEDEC MO–220.

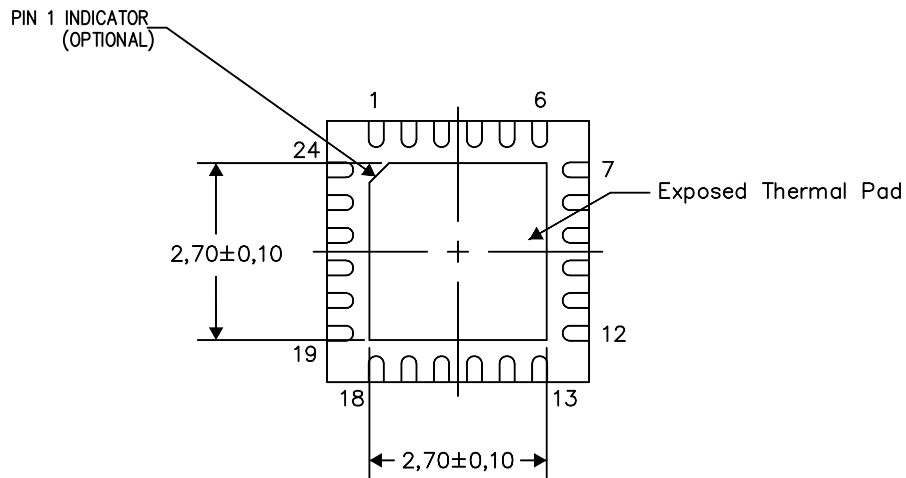
RGE (S-PVQFN-N24) PLASTIC QUAD FLATPACK NO-LEAD

## 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

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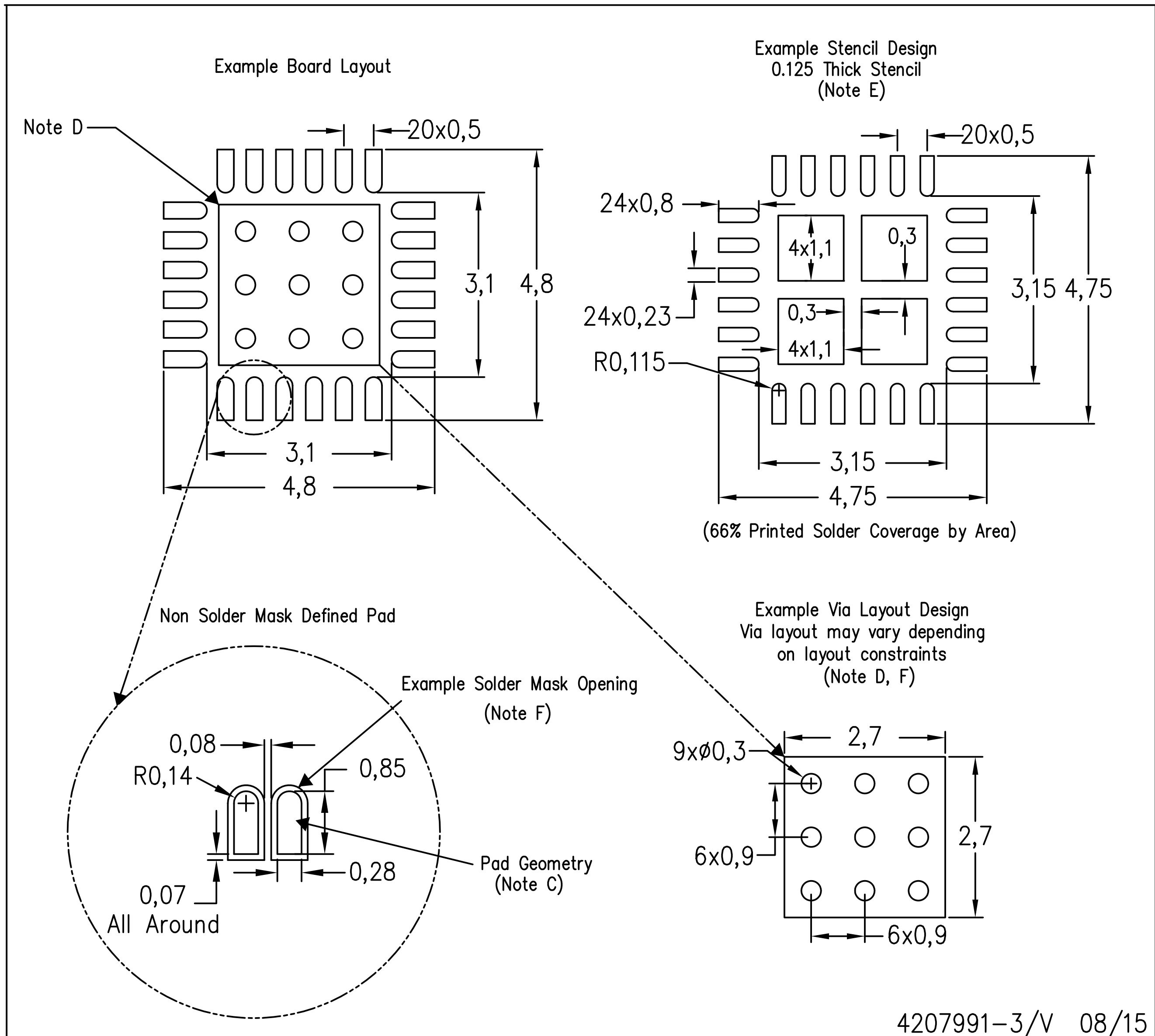
NOTES: A. All linear dimensions are in millimeters

RGE (S-PVQFN-N24) 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 Packages, 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 recommended solder mask tolerances and via tenting recommendations for vias placed in the thermal pad.

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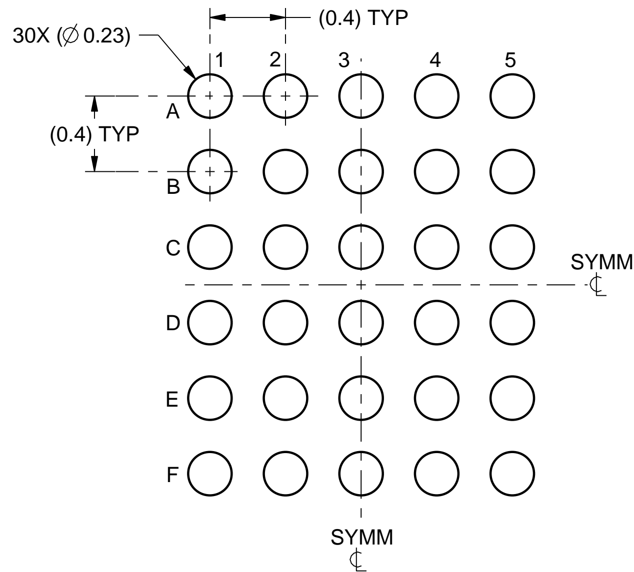
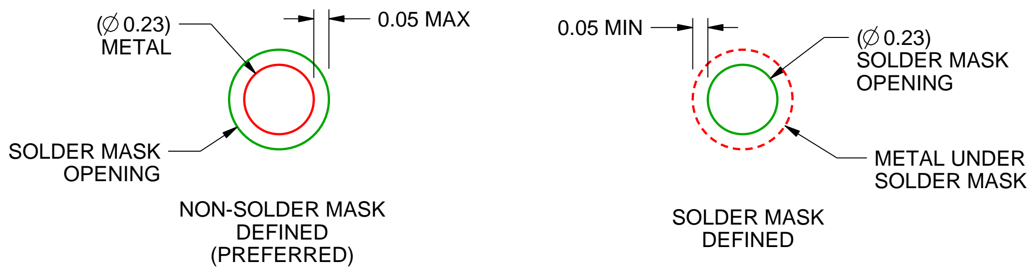
NOTES:

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.




LAND PATTERN EXAMPLE
SCALE:25X




SOLDER MASK DETAILS
NOT TO SCALE

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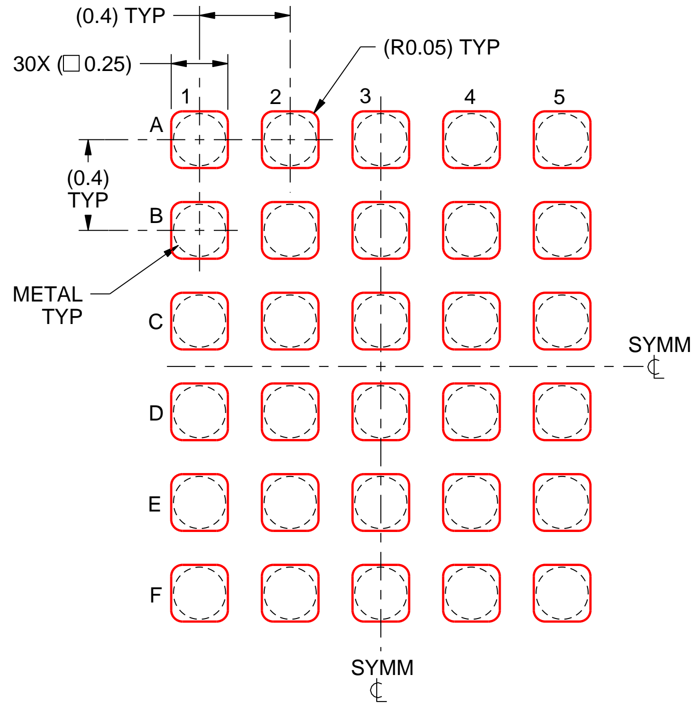
NOTES: (continued)

3. Final dimensions may vary due to manufacturing tolerance considerations and also routing constraints.
For more information, see Texas Instruments literature number SNVA009 (www.ti.com/lit/snva009).




SOLDER PASTE EXAMPLE
BASED ON 0.1 mm THICK STENCIL
SCALE:30X

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NOTES: (continued)

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

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