具有故障保护功能的 TCAN1057A-Q1 和 TCAN1057AV-Q1 汽车类 CAN FD 收发器

1 特性

- AEC-Q100（1 级）：符合汽车应用要求
- 符合 ISO 11898-2:2016 和 ISO 11898-5:2007 物理层标准的要求
- 支持传统 CAN 和经优化的 CAN FD 性能（数据速率为 2、5 和 8Mbps）
  - 具有较短的对称传播延迟时间，可增加时序裕量
  - 在有负载 CAN 网络中实现更快的数据速率
- TCAN1057V I/O 电压范围支持 1.7V 至 5.5V
  - 支持 1.8V、2.5V、3.3V 和 5V 应用
- 保护特性：
  - 总线故障保护：±58V
  - 欠压保护
  - TXD 显性超时 (DTO)
    - 数据速率低至 9.2kbps
  - 热关断保护 (TSD)
- 工作模式：
  - 正常模式
- 优化了未上电时的性能
  - 总线和逻辑引脚为高阻抗（运行总线或应用上无负载）
  - 支持热插拔：在总线和 RXD 输出上可实现上电/断电无干扰运行
- 结温范围：–40°C 至 150°C
- 接收器共模输入电压：±12V
- 采用 SOIC (8)、SOT23 (8) 和无引线 VSON (8) 封装，具有改善的自动光学检测 (AOI) 功能

2 应用

- 汽车和运输
  - 车身控制模块
  - 汽车网关
  - 高级驾驶辅助系统 (ADAS)
  - 信息娱乐系统

3 说明

TCAN1057A-Q1 和 TCAN1057AV-Q1 是高速控制器局域网 (CAN) 收发器，满足 ISO 11898-2:2016 高速 CAN 规范的物理层要求。

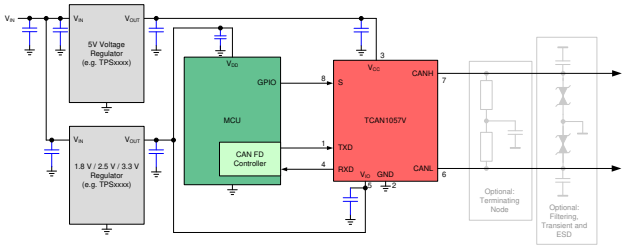
此类收发器具有良好的电磁兼容性 (EMC)，是数据速率高达 8 兆位/秒 (Mbps) 的传统 CAN 和 CAN FD 网络的理想选择。收发器支持两种工作模式：正常模式和静音模式。此外，还支持许多保护和诊断功能，其中包括热关断 (TSD)、TXD 驱动器显性超时 (DTO) 和高达 ±58V 的总线故障保护。

收发器具有通过 VIO 引脚实现的集成电平转换器，该电平转换器提供内部逻辑电平转换功能，允许将收发器 I/O 直接连接到 1.8V、2.5V、3.3V 或 5V 逻辑 I/O。

器件信息

器件型号	封装(1)	封装尺寸（标称值）
TCAN1057A-Q1 TCAN1057AV-Q1	SOT (DDF) (8)	2.90mm x 1.60mm
	VSON (DRB) (8)	3.00mm x 3.00mm
	SOIC (D) (8)	4.90mm x 3.91mm

(1) 如需了解所有可用封装，请参阅数据表末尾的可订购产品附录。



简化版原理图

ADVANCE INFORMATION

4 Pin Configuration and Functions

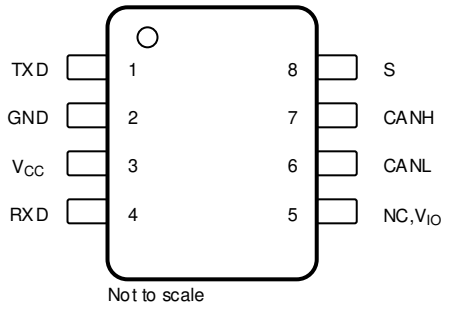


图 4-1. DDF Package, 8-Pin SOT, Top View

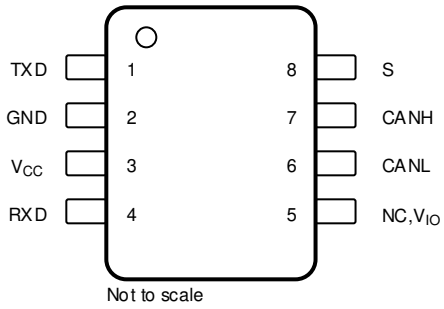


图 4-2. D Package, 8-Pin SOIC, Top View

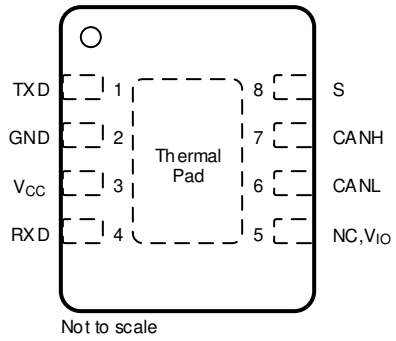


图 4-3. DRB Package, 8-Pin VSON, Top View

表 4-1. Pin Functions

Pins		Type	Description
Name	No.		
TXD	1	Digital Input	CAN transmit data input
GND	2	GND	Ground connection
V_{CC}	3	Supply	5-V supply voltage
RXD	4	Digital Output	CAN receive data output, tri-state when powered off
NC	5	—	No connect (not internally connected); devices without V_{IO}
V_{IO}		Supply	I/O supply voltage
CANL	6	Bus IO	Low-level CAN bus input/output line
CANH	7	Bus IO	High-level CAN bus input/output line
S	8	Digital Input	Silent mode control input, integrated pull-up
Thermal Pad (VSON only)		—	Electrically connected to GND, connect the thermal pad to the printed circuit board (PCB) ground plane for thermal relief

ADVANCE INFORMATION

5 Device and Documentation Support

5.1 Documentation Support

5.1.1 Related Links

The table below lists quick access links. Categories include technical documents, support and community resources, tools and software, and quick access to order now.

表 5-1. Related Links

PARTS	PRODUCT FOLDER	ORDER NOW	TECHNICAL DOCUMENTS	TOOLS & SOFTWARE	SUPPORT & COMMUNITY
TCAN1057A-Q1	Click here	Click here	Click here	Click here	Click here
TCAN1057AV-Q1	Click here	Click here	Click here	Click here	Click here

5.2 接收文档更新通知

要接收文档更新通知，请导航至 ti.com 上的器件产品文件夹。点击 *订阅更新* 进行注册，即可每周接收产品信息更改摘要。有关更改的详细信息，请查看任何已修订文档中包含的修订历史记录。

5.3 支持资源

TI E2E™ 支持论坛是工程师的重要参考资料，可直接从专家获得快速、经过验证的解答和设计帮助。搜索现有解答或提出自己的问题可获得所需的快速设计帮助。

链接的内容由各个贡献者“按原样”提供。这些内容并不构成 TI 技术规范，并且不一定反映 TI 的观点；请参阅 TI 的《使用条款》。

5.4 Trademarks

TI E2E™ is a trademark of Texas Instruments.
所有商标均为其各自所有者的财产。

5.5 静电放电警告

静电放电 (ESD) 会损坏这个集成电路。德州仪器 (TI) 建议通过适当的预防措施处理所有集成电路。如果不遵守正确的处理和安装程序，可能会损坏集成电路。

ESD 的损坏小至导致微小的性能降级，大至整个器件故障。精密的集成电路可能更容易受到损坏，这是因为非常细微的参数更改都可能会导致器件与其发布的规格不相符。

5.6 术语表

TI 术语表　　本术语表列出并解释了术语、首字母缩略词和定义。

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

PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead finish/ Ball material (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
PTCAN1057ADDFRQ1	ACTIVE	SOT-23-THIN	DDF	8	3000	Non-RoHS & Non-Green	Call TI	Call TI	-40 to 150		Samples
PTCAN1057ADRBRQ1	ACTIVE	SON	DRB	8	3000	Non-RoHS & Non-Green	Call TI	Call TI	-40 to 150		Samples
PTCAN1057ADRQ1	ACTIVE	SOIC	D	8	2500	Non-RoHS & Non-Green	Call TI	Call TI	-40 to 150		Samples
PTCAN1057AVDDFRQ1	ACTIVE	SOT-23-THIN	DDF	8	3000	Non-RoHS & Non-Green	Call TI	Call TI	-40 to 150		Samples
PTCAN1057AVDRBRQ1	ACTIVE	SON	DRB	8	3000	Non-RoHS & Non-Green	Call TI	Call TI	-40 to 150		Samples
PTCAN1057AVDRQ1	ACTIVE	SOIC	D	8	2500	Non-RoHS & Non-Green	Call TI	Call TI	-40 to 150		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) **RoHS:** TI defines "RoHS" to mean semiconductor products that are compliant with the current EU RoHS requirements for all 10 RoHS substances, including the requirement that RoHS substance do not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, "RoHS" products are suitable for use in specified lead-free processes. TI may reference these types of products as "Pb-Free".
RoHS Exempt: TI defines "RoHS Exempt" to mean products that contain lead but are compliant with EU RoHS pursuant to a specific EU RoHS exemption.
Green: TI defines "Green" to mean the content of Chlorine (Cl) and Bromine (Br) based flame retardants meet JS709B low halogen requirements of <=1000ppm threshold. Antimony trioxide based flame retardants must also meet the <=1000ppm threshold requirement.

(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.

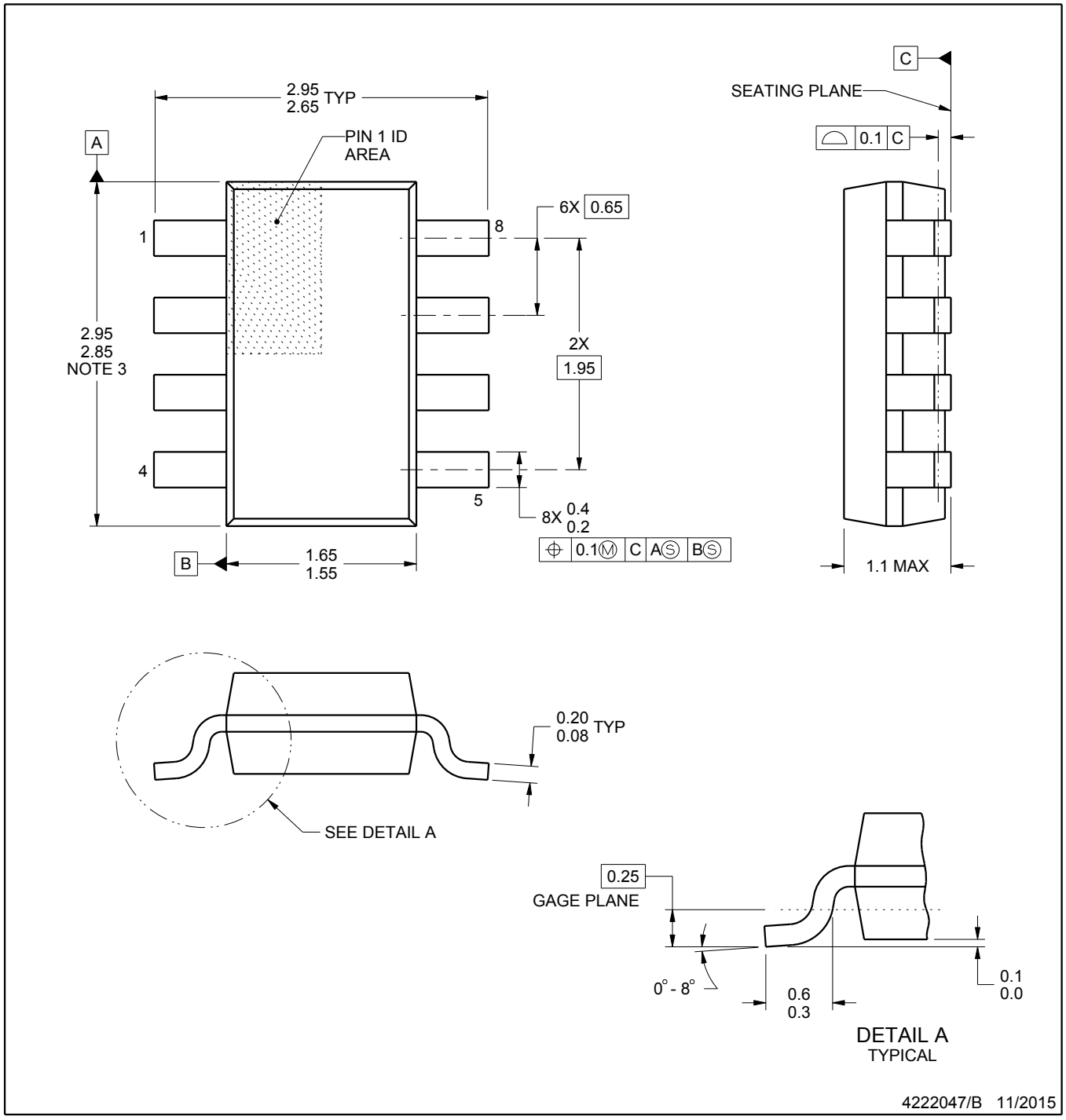
(6) Lead finish/Ball material - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

PACKAGE OUTLINE

DDF0008A

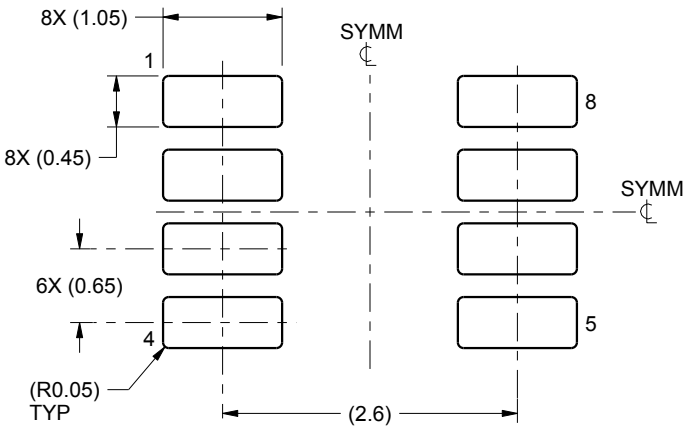
SOT-23 - 1.1 mm max height

PLASTIC SMALL OUTLINE

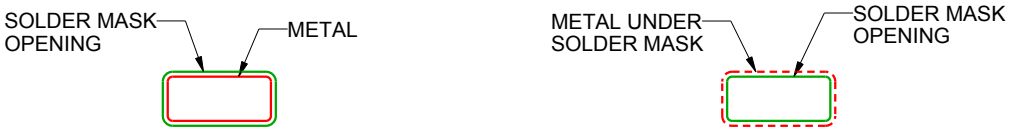


NOTES:

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.
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.



LAND PATTERN EXAMPLE
SCALE:15X



NON SOLDER MASK
DEFINED

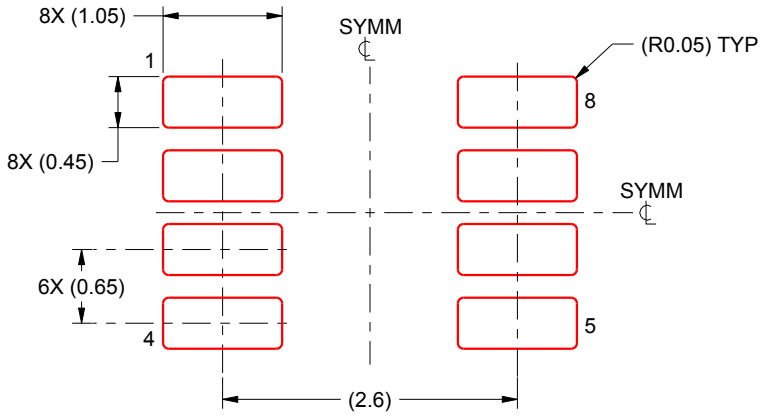
SOLDER MASK
DEFINED

SOLDER MASK DETAILS

4222047/B 11/2015

NOTES: (continued)

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



SOLDER PASTE EXAMPLE
BASED ON 0.125 mm THICK STENCIL
SCALE:15X

4222047/B 11/2015

NOTES: (continued)

6. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
7. Board assembly site may have different recommendations for stencil design.

GENERIC PACKAGE VIEW

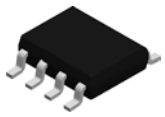
DRB 8

VSON - 1 mm max height

PLASTIC SMALL OUTLINE - NO LEAD

Images above are just a representation of the package family, actual package may vary.
Refer to the product data sheet for package details.

4203482/L

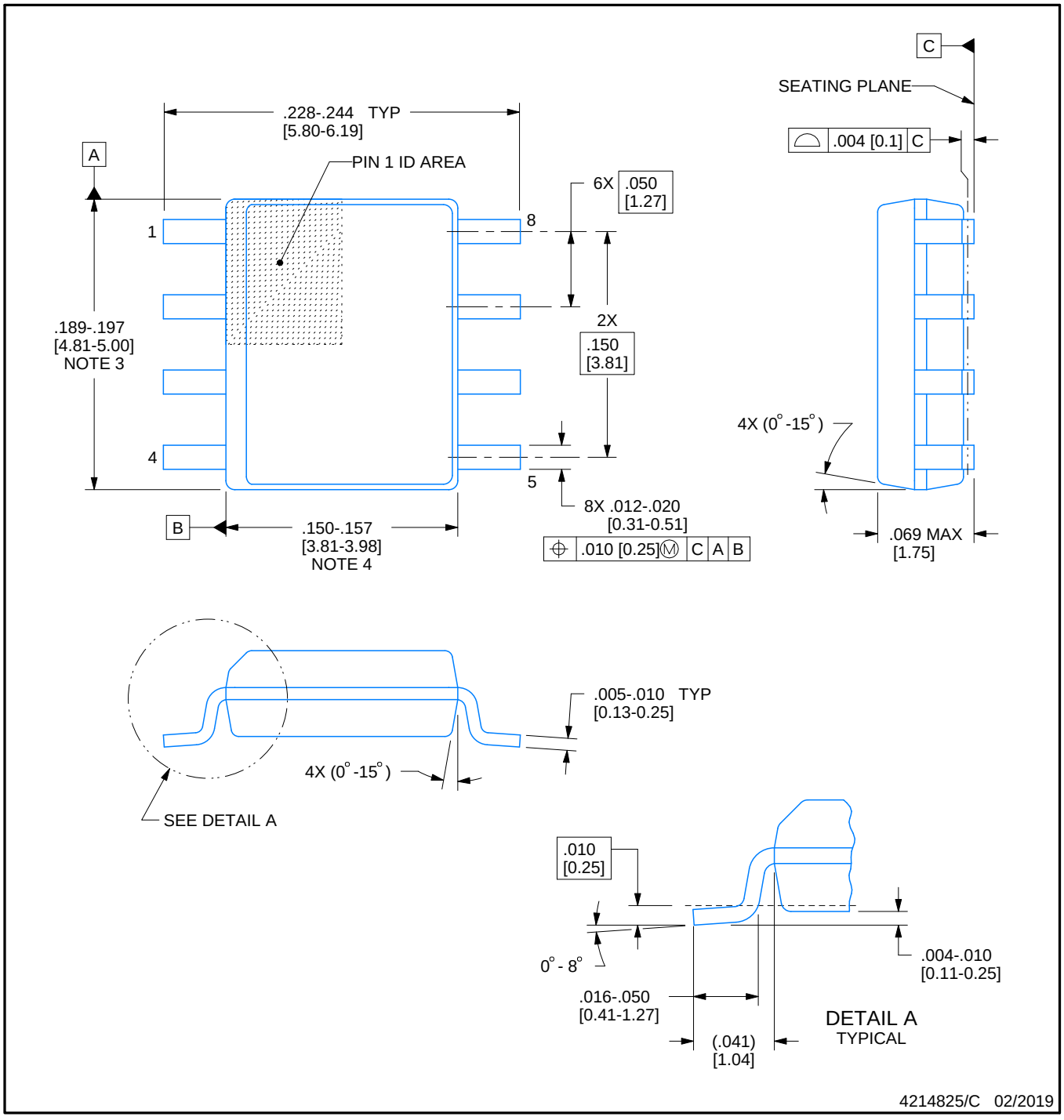


PACKAGE OUTLINE

D0008A

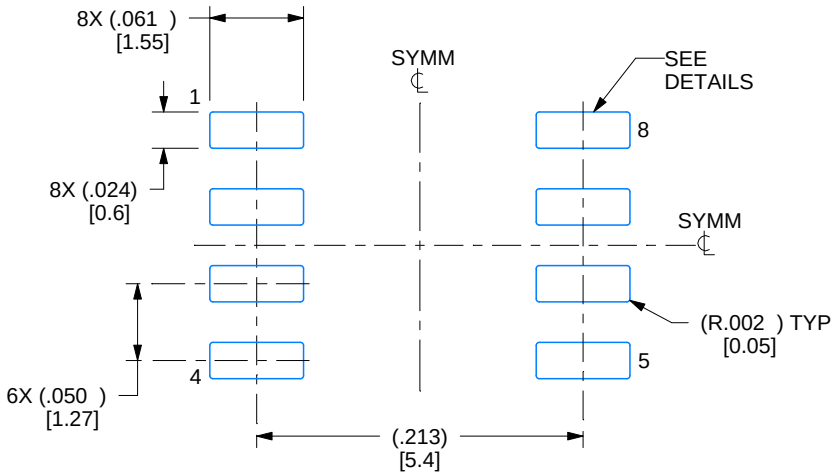
SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT

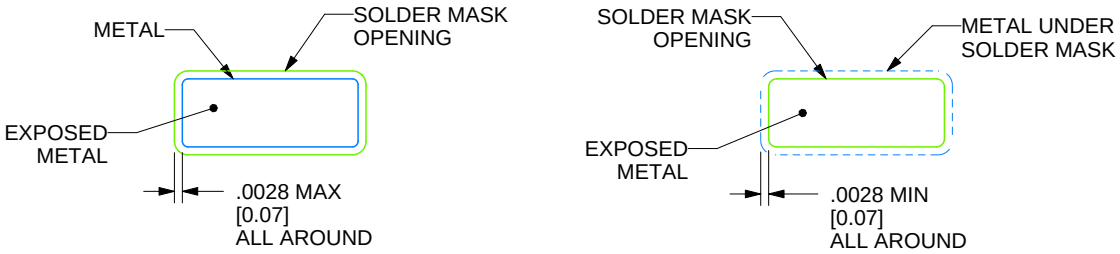


NOTES:

1. Linear dimensions are in inches [millimeters]. Dimensions in parenthesis are for reference only. Controlling dimensions are in inches. 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 .006 [0.15] per side.
4. This dimension does not include interlead flash.
5. Reference JEDEC registration MS-012, variation AA.



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE:8X



SOLDER MASK DETAILS

4214825/C 02/2019

NOTES: (continued)

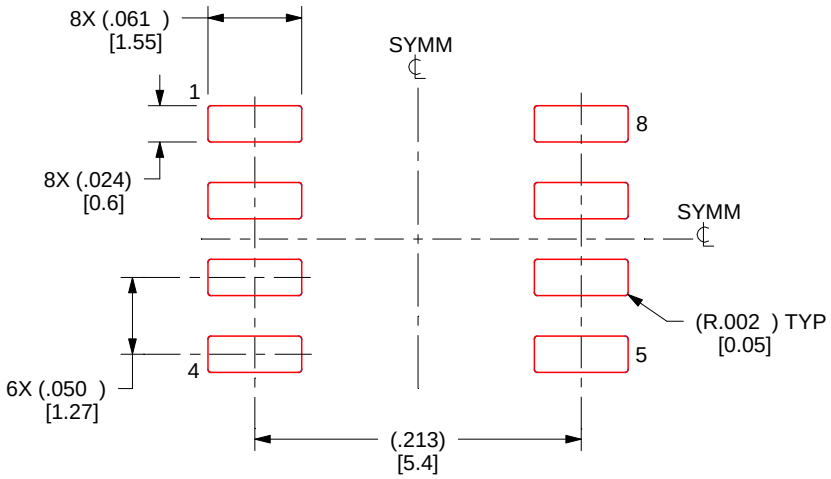
6. Publication IPC-7351 may have alternate designs.
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

EXAMPLE STENCIL DESIGN

D0008A

SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT



SOLDER PASTE EXAMPLE
BASED ON .005 INCH [0.125 MM] THICK STENCIL
SCALE:8X

4214825/C 02/2019

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.

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