

UCC2720xA 120V 升压 3A 峰值电流的高频高侧和低侧驱动器

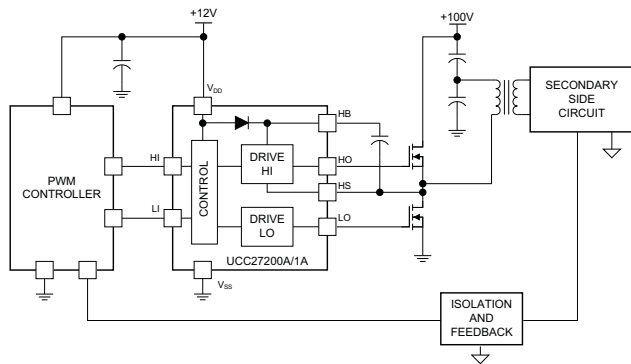
1 特性

- 可驱动两个采用高侧和低侧配置的 N 沟道金属氧化物半导体场效应晶体管 (MOSFET)
- HS 引脚具备 -18V 的负电压处理能力
- 最大启动电压: 120V
- 最大 VDD 电压: 20V
- 片载 0.65V VF, 0.6Ω RD 自举二极管
- 工作频率高于 1MHz
- 20ns 传播延迟时间
- 3A 吸收, 3A 供电输出电流
- 8ns 上升 / 7ns 下降时间 (采用 1000pF 负载时)
- 1ns 延迟匹配
- 用于高侧和低侧驱动器的欠压锁定功能
- 提供 8 引脚小外形尺寸集成电路 (SOIC) (D)、PowerPAD™SOIC-8 (DDA)、SON-8 (DRM)、SON-9 (DRC) 和 SON-10 (DPR) 五种封装
- -40°C 至 140°C 的额定温度范围

2 应用

- 针对电信、数据通信和商业的电源
- 半桥应用 和全桥转换器
- 隔离式总线架构
- 两开关正激式转换器
- 有源箝位正激式转换器
- 高电压同步降压转换器
- D 类音频放大器

简化应用示意图



3 说明

UCC2720xA 系列高频 N 沟道 MOSFET 驱动器由 120V 自举二极管和高侧/低侧驱动器组成, 其中高侧/低侧驱动器配有独立输入, 可最大限度提高控制灵活性。这可在半桥转换器、全桥转换器、双开关正激转换器和有源箝位正激转换器中实现 N 沟道 MOSFET 控制。低侧和高侧栅极驱动器是独立控制的, 并在彼此的接通和关断之间实现了 1ns 的延迟匹配。UCC2720xA 基于常见的 UCC27200/1 驱动器, 但提供了一些增强功能。UCC2720xA 具有增强型 ESD 输入结构并且其 HS 引脚最高能够承受 -18V 电压, 这使得其在嘈杂电源环境下的性能得到了改善。

由于在芯片上集成了一个自举二极管, 因此无需采用外部分立式二极管。为高端和低端驱动器提供了欠压闭锁功能, 如果驱动电压低于规定的门限, 则强制输出为低电平。

UCC27200A 提供了两种版本。UCC27200A 具有高抗扰度 CMOS 输入阈值, 而 UCC27201A 则具有兼容晶体管-晶体管逻辑电路 (TTL) 的阈值。

两款器件均提供 8 引脚 SOIC (D)、PowerPad SOIC-8 (DDA)、SON-8 (DRM)、9 引脚 SON-9 (DRC) 和 10 引脚 SON-10 (DPR) 五种封装。

器件信息⁽¹⁾

| 器件型号 | 封装 | 封装尺寸 (标称值) |
|-------------------------|-----------|-----------------|
| UCC27200A, UCC27201A | SOIC (8) | 4.90mm x 3.91mm |
| | HSOP (8) | 4.89mm x 3.90mm |
| | VSON (9) | 3.00mm x 3.00mm |
| | VSON (8) | 4.00mm x 4.00mm |
| UCC27201A | WSON (10) | 4.00mm x 4.00mm |

(1) 要了解所有可用封装, 请见数据表末尾的可订购产品附录。



目录

| | | | | | |
|----------|--|-----------|-----------|---|-----------|
| 1 | 特性 | 1 | 7.4 | Device Functional Modes..... | 13 |
| 2 | 应用 | 1 | 8 | Application and Implementation | 14 |
| 3 | 说明 | 1 | 8.1 | Application Information..... | 14 |
| 4 | 修订历史记录 | 2 | 8.2 | Typical Application | 14 |
| 5 | Pin Configuration and Functions | 3 | 9 | Power Supply Recommendations | 20 |
| 6 | Specifications..... | 5 | 10 | Layout..... | 20 |
| 6.1 | Absolute Maximum Ratings | 5 | 10.1 | Layout Guidelines | 20 |
| 6.2 | ESD Ratings..... | 5 | 10.2 | Layout Example | 21 |
| 6.3 | Recommended Operating Conditions..... | 5 | 11 | 器件和文档支持 | 22 |
| 6.4 | Thermal Information | 6 | 11.1 | 文档支持 | 22 |
| 6.5 | Electrical Characteristics..... | 6 | 11.2 | 相关链接 | 22 |
| 6.6 | Typical Characteristics | 8 | 11.3 | 社区资源 | 22 |
| 7 | Detailed Description | 12 | 11.4 | 商标 | 22 |
| 7.1 | Overview | 12 | 11.5 | 静电放电警告 | 22 |
| 7.2 | Functional Block Diagram | 12 | 11.6 | Glossary | 22 |
| 7.3 | Feature Description..... | 12 | 12 | 机械、封装和可订购信息 | 22 |

4 修订历史记录

注：之前版本的页码可能与当前版本有所不同。

Changes from Revision A (July 2011) to Revision B

Page

| | | |
|---|--|---|
| • | 已添加“HS 引脚具备 -18V 的负电压处理能力”至 特性 列表 | 1 |
| • | 已添加 引脚配置和功能部分, ESD 额定值表, 特性 描述 部分, 器件功能模式, 应用和实施部分, 电源相关建议部分, 布局部分, 器件和文档支持部分以及机械、封装和可订购信息部分 | 1 |

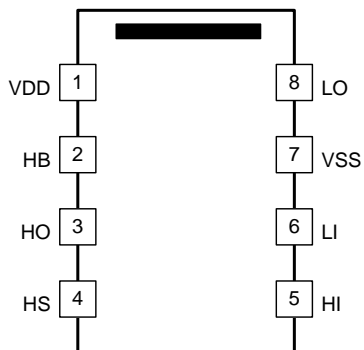
Changes from Original (February 2011) to Revision A

Page

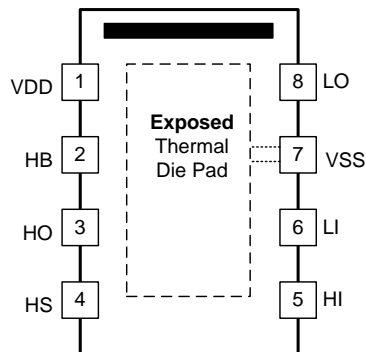
| | | |
|---|--|---|
| • | 已将“小外形尺寸无引线 (SON)-10 (DPR) 封装”添加至 特性列表 | 1 |
| • | 已将“SON-10 (DPR) 封装”添加至 说明 | 1 |
| • | Changed the PIN FUNCTIONS table | 4 |
| • | Added Additional PIN FUNCTIONS information..... | 4 |
| • | Added ordering information for the SON-10 (DPR)..... | 5 |
| • | Added note, "DPR(SON-10) package comes either in a small reel of 250 pieces as part number UCC27200ADPRT, or large reels pieces as part number UCC27200ADPRR." | 5 |
| • | Added the SON-10 package to the ORDERING INFORMATION table..... | 5 |
| • | Added the SON-10 package to the THERMAL INFORMATION table | 5 |
| • | Changed the "Minimum input pulse width" value From: 50 ns Max To: 50 ns Typ..... | 7 |

5 Pin Configuration and Functions

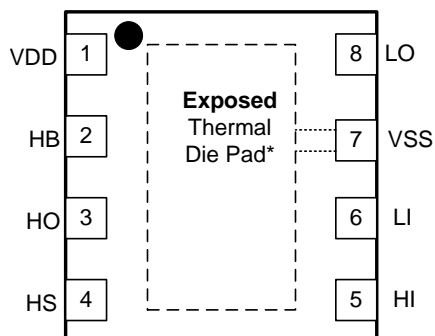
D Package
8-Pin SOIC
Top View



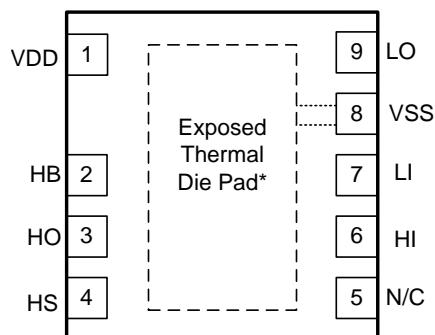
DDA Package
8-Pin SOIC With Exposed PowerPAD
Top View



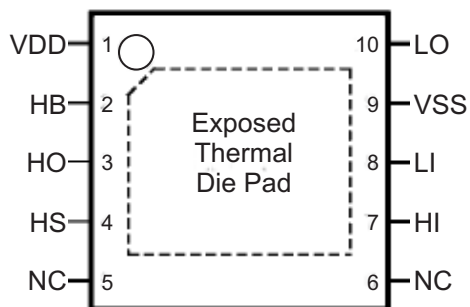
DRM Package
8-Pin SON
Top View



DRC Package
9-Pin SON
Top View



DPR Package
10-Pin SON
Top View



Pin Functions

| NAME | PIN | | | I/O | DESCRIPTION |
|-------------------------|-----------|-----|-----|-----|---|
| | DRM/D/DDA | DRC | DPR | | |
| VDD | 1 | 1 | 1 | I | Positive supply to the lower gate driver. De-couple this pin to VSS (GND). Typical decoupling capacitor range is 0.22 μ F to 1.0 μ F. |
| HB | 2 | 2 | 2 | I | High-side bootstrap supply. The bootstrap diode is on-chip but the external bootstrap capacitor is required. Connect positive side of the bootstrap capacitor to this pin. Typical range of HB bypass capacitor is 0.022 μ F to 0.1 μ F, the value is dependant on the gate charge of the high-side MOSFET however. |
| HO | 3 | 3 | 3 | O | High-side output. Connect to the gate of the high-side power MOSFET. |
| HS | 4 | 4 | 4 | I | High-side source connection. Connect to source of high-side power MOSFET. Connect negative side of bootstrap capacitor to this pin. |
| HI | 5 | 6 | 7 | I | High-side input. |
| LI | 6 | 7 | 8 | I | Low-side input. |
| VSS | 7 | 8 | 9 | O | Negative supply terminal for the device which is generally grounded. |
| LO | 8 | 9 | 10 | O | Low-side output. Connect to the gate of the low-side power MOSFET. |
| N/C | — | 5 | 5/6 | — | No connection. Pins labeled N/C have no connection. |
| PowerPAD ⁽¹⁾ | — | — | — | — | Connect to a large thermal mass trace or GND plane to dramatically improve thermal performance. |

- (1) Pin VSS and the exposed thermal die pad are internally connected on the DDA and DRM packages only. Electrically referenced to VSS (GND).

6 Specifications

6.1 Absolute Maximum Ratings

Over operating free-air temperature, unless noted, all voltages are with respect to V_{SS} ⁽¹⁾

| | | MIN | MAX | UNIT |
|--|---|----------------|--|------|
| Supply voltage range, ⁽²⁾ V_{DD} | | -0.3 | 20 | V |
| Input voltages on LI and HI, V_{LI} , V_{HI} | | -0.3 | 20 | V |
| Output voltage on LO, V_{LO} | DC | -0.3 | $V_{DD} + 0.3$ | V |
| | Repetitive pulse <100 ns ⁽³⁾ | -2 | $V_{DD} + 0.3$ | |
| Output voltage on HO, V_{HO} | DC | $V_{HS} - 0.3$ | $V_{HB} + 0.3$ | V |
| | Repetitive pulse <100 ns ⁽³⁾ | $V_{HS} - 2$ | $V_{HB} + 0.3$, ($V_{HB} - V_{HS} < 20$) | |
| Voltage on HS, V_{HS} | DC | -1 | 120 | V |
| | Repetitive pulse <100 ns ⁽³⁾ | -18 | 120 | |
| Voltage on HB, V_{HB} | | -0.3 | 120 | V |
| Voltage On HB-HS | | -0.3 | 120 | V |
| Operating virtual junction temperature range, T_J | | -40 | 150 | °C |
| Lead temperature (soldering, 10 sec.) | | | 300 | °C |
| Power dissipation at $T_A = 25^\circ\text{C}$ (D package) ⁽⁴⁾ | | | 1.3 | W |
| Power dissipation at $T_A = 25^\circ\text{C}$ (DDA package) ⁽⁴⁾ | | | 2.7 | W |
| Power dissipation at $T_A = 25^\circ\text{C}$ (DRM package) ⁽⁴⁾ | | | 3.3 | W |
| Power dissipation at $T_A = 25^\circ\text{C}$ (DRC package) ⁽⁴⁾ | | | 2.86 | W |
| 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) All voltages are with respect to V_{SS} . Currents are positive into, negative out of the specified terminal.
- (3) Values are verified by characterization and are not production tested.
- (4) This data was taken using the JEDEC proposed high-K test PCB. See the THERMAL CHARACTERISTICS section for details.

6.2 ESD Ratings

| | | VALUE | UNIT |
|-------------|-------------------------|--|------|
| $V_{(ESD)}$ | Electrostatic discharge | Human body model (HBM), per ANSI/ESDA/JEDEC JS-001 ⁽¹⁾ | 2000 |
| | | Charged-device model (CDM), per JEDEC specification JESD22-C101 ⁽²⁾ | 1000 |

- (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)

| PARAMETER | | MIN | NOM | MAX | UNIT |
|-----------|---|--------------------------------|-----|------------------------|--------|
| V_{DD} | Supply voltage | 8 | 12 | 17 | V |
| V_{HS} | Voltage on HS | -1 | | 105 | V |
| | Voltage on HS, (repetitive pulse <100 ns) | -15 | | 110 | V |
| V_{HB} | Voltage on HB | $V_{HS} + 8$, $V_{DD} - 1$ | | $V_{HS} + 17$, 115 | V |
| | Voltage slew rate on HS | | | 50 | V / ns |
| T_J | Operating junction temperature range | -40 | | 140 | °C |

6.4 Thermal Information

| THERMAL METRIC ⁽¹⁾ | | UCC27200A /UCC27201A | UCC27200A /UCC27201A | UCC27200A /UCC27201A | UCC27200A /UCC27201A | UCC27200A /UCC27201A | UNIT |
|-------------------------------|--|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|------|
| | | DRM (VSON) | DRC (VSON) | DPR (WSON) | D (SOIC) | DDA (HSOP) | |
| | | 8 PINS | 9 PINS | 10 PINS | 8 PINS | 8 PINS | |
| R _{θJA} | Junction-to-ambient thermal resistance | 36.2 | 43.7 | 34.8 | 106.5 | 40.5 | °C/W |
| R _{θJC(top)} | Junction-to-case (top) thermal resistance | 41.6 | 49.9 | 32.1 | 52.9 | 49 | °C/W |
| R _{θJB} | Junction-to-board thermal resistance | 13.2 | 19.1 | 11.9 | 46.6 | 10.2 | °C/W |
| ψ _{JT} | Junction-to-top characterization parameter | 0.6 | 0.6 | 0.2 | 9.6 | 3.1 | °C/W |
| ψ _{JB} | Junction-to-board characterization parameter | 13.4 | 19.3 | 12.2 | 46.1 | 9.7 | °C/W |
| R _{θJC(bot)} | Junction-to-case (bottom) thermal resistance | 3.1 | 3.8 | 1.3 | — | 1.5 | °C/W |

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

6.5 Electrical Characteristics

over operating free-air temperature range, V_{DD} = V_{HB} = 12 V, V_{HS} = V_{SS} = 0 V, No load on LO or HO, T_A = T_J = –40°C to +140°C, (unless otherwise noted)

| PARAMETER | | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---------------------------------------|---|---|-----|--------|------|------|
| SUPPLY CURRENTS | | | | | | |
| I _{DD} | VDD quiescent current | V _{LI} = V _{HI} = 0 | | 0.4 | 0.8 | mA |
| I _{DDO} | VDD operating current | UCC27200A | | 2.5 | 4 | mA |
| | | UCC27201A | | 3.8 | 5.5 | |
| I _{HB} | Boot voltage quiescent current | V _{LI} = V _{HI} = 0 V | | 0.4 | 0.8 | mA |
| I _{HBO} | Boot voltage operating current | f = 500 kHz, C _{LOAD} = 0 | | 2.5 | 4 | mA |
| I _{HBS} | HB to V _{SS} quiescent current | V _{HS} = V _{HB} = 110 V | | 0.0005 | 1 | µA |
| I _{HBSO} | HB to V _{SS} operating current | f = 500 kHz, C _{LOAD} = 0 | | 0.1 | | mA |
| INPUT | | | | | | |
| V _{HIT} | Input rising threshold | UCC27200A | | 5.8 | 8 | V |
| V _{LIT} | Input falling threshold | UCC27200A | 3 | 5.4 | | V |
| V _{IHYS} | Input voltage hysteresis | UCC27200A | | 0.4 | | V |
| V _{HIT} | Input voltage threshold | UCC27201A | | 1.7 | 2.5 | V |
| V _{LIT} | Input voltage threshold | UCC27201A | 0.8 | 1.6 | | V |
| V _{IHYS} | Input voltage Hysteresis | UCC27201A | | 100 | | mV |
| R _{IN} | Input pulldown resistance | UCC27201A | 100 | 200 | 350 | kΩ |
| UNDERVOLTAGE PROTECTION (UVLO) | | | | | | |
| | VDD rising threshold | | 6.2 | 7.1 | 7.8 | V |
| | VDD threshold hysteresis | | | 0.5 | | V |
| | VHB rising threshold | | 5.8 | 6.7 | 7.2 | V |
| | VHB threshold hysteresis | | | 0.4 | | V |
| BOOTSTRAP DIODE | | | | | | |
| V _F | Low-current forward voltage | I _{VDD} - HB = 100 µA | | 0.65 | 0.85 | V |
| V _{FI} | High-current forward voltage | I _{VDD} - HB = 100 mA | | 0.85 | 1.1 | V |
| R _D | Dynamic resistance, ΔV _F /ΔI | I _{VDD} - HB = 100 mA and 80 mA | | 0.6 | 1.0 | Ω |

Electrical Characteristics (continued)

over operating free-air temperature range, $V_{DD} = V_{HB} = 12\text{ V}$, $V_{HS} = V_{SS} = 0\text{ V}$, No load on LO or HO, $T_A = T_J = -40^\circ\text{C}$ to $+140^\circ\text{C}$, (unless otherwise noted)

| PARAMETER | | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|--------------------------------------|---|---|------|------|------|
| LO GATE DRIVER | | | | | | |
| V_{LOL} | Low level output voltage | $I_{LO} = 100\text{ mA}$ | | 0.18 | 0.4 | V |
| V_{LOH} | High level output voltage | $T_J = -40\text{ to }125^\circ\text{C}$ | $I_{LO} = -100\text{ mA}$, $V_{LOH} = V_{DD} - V_{LO}$ | 0.25 | 0.4 | V |
| | | $T_J = -40\text{ to }140^\circ\text{C}$ | $I_{LO} = -100\text{ mA}$, $V_{LOH} = V_{DD} - V_{LO}$ | 0.25 | 0.42 | |
| Peak pullup current | | $V_{LO} = 0\text{ V}$ | | 3 | | A |
| Peak pulldown current | | $V_{LO} = 12\text{ V}$ | | 3 | | A |
| HO GATE DRIVER | | | | | | |
| V_{HOL} | Low level output voltage | $I_{HO} = 100\text{ mA}$ | | 0.18 | 0.4 | V |
| V_{HOH} | High level output voltage | $T_J = -40\text{ to }125^\circ\text{C}$ | $I_{HO} = -100\text{ mA}$, $V_{HOH} = V_{HB} - V_{HO}$ | 0.25 | 0.4 | V |
| | | $T_J = -40\text{ to }140^\circ\text{C}$ | $I_{HO} = -100\text{ mA}$, $V_{HOH} = V_{HB} - V_{HO}$ | 0.25 | 0.42 | |
| Peak pullup current | | $V_{HO} = 0\text{ V}$ | | 3 | | A |
| Peak pulldown current | | $V_{HO} = 12\text{ V}$ | | 3 | | A |
| PROPAGATION DELAYS | | | | | | |
| t_{DLFF} | V_{LI} falling to V_{LO} falling | $T_J = -40\text{ to }125^\circ\text{C}$ | $C_{LOAD} = 0$ | 20 | 45 | ns |
| | | $T_J = -40\text{ to }140^\circ\text{C}$ | $C_{LOAD} = 0$ | 20 | 50 | |
| t_{DHFF} | V_{HI} falling to V_{HO} falling | $T_J = -40\text{ to }125^\circ\text{C}$ | $C_{LOAD} = 0$ | 20 | 45 | ns |
| | | $T_J = -40\text{ to }140^\circ\text{C}$ | $C_{LOAD} = 0$ | 20 | 50 | |
| t_{DLRR} | V_{LI} rising to V_{LO} rising | $T_J = -40\text{ to }125^\circ\text{C}$ | $C_{LOAD} = 0$ | 20 | 45 | ns |
| | | $T_J = -40\text{ to }140^\circ\text{C}$ | $C_{LOAD} = 0$ | 20 | 50 | |
| t_{DHRR} | V_{HI} rising to V_{HO} rising | $T_J = -40\text{ to }125^\circ\text{C}$ | $C_{LOAD} = 0$ | 20 | 45 | ns |
| | | $T_J = -40\text{ to }140^\circ\text{C}$ | $C_{LOAD} = 0$ | 20 | 50 | |
| DELAY MATCHING | | | | | | |
| t_{MON} | LI ON, HI OFF | | | 1 | 7 | ns |
| t_{MOFF} | LI OFF, HI ON | | | 1 | 7 | ns |
| OUTPUT RISE AND FALL TIME | | | | | | |
| t_R | LO, HO | $C_{LOAD} = 1000\text{ pF}$ | | 8 | | ns |
| t_F | LO, HO | $C_{LOAD} = 1000\text{ pF}$ | | 7 | | ns |
| t_R | LO, HO (3 V to 9 V) | $C_{LOAD} = 0.1\text{ }\mu\text{F}$ | | 0.35 | 0.6 | us |
| t_F | LO, HO (3 V to 9 V) | $C_{LOAD} = 0.1\text{ }\mu\text{F}$ | | 0.3 | 0.6 | us |
| MISCELLANEOUS | | | | | | |
| Minimum input pulse width that changes the output | | | | 50 | | ns |
| Bootstrap diode turnoff time | | $I_F = 20\text{ mA}$, $I_{REV} = 0.5\text{ A}^{(1) (2)}$ | | 20 | | ns |

(1) Typical values for $T_A = 25^\circ\text{C}$

(2) I_F : Forward current applied to bootstrap diode, I_{REV} : Reverse current applied to bootstrap diode.

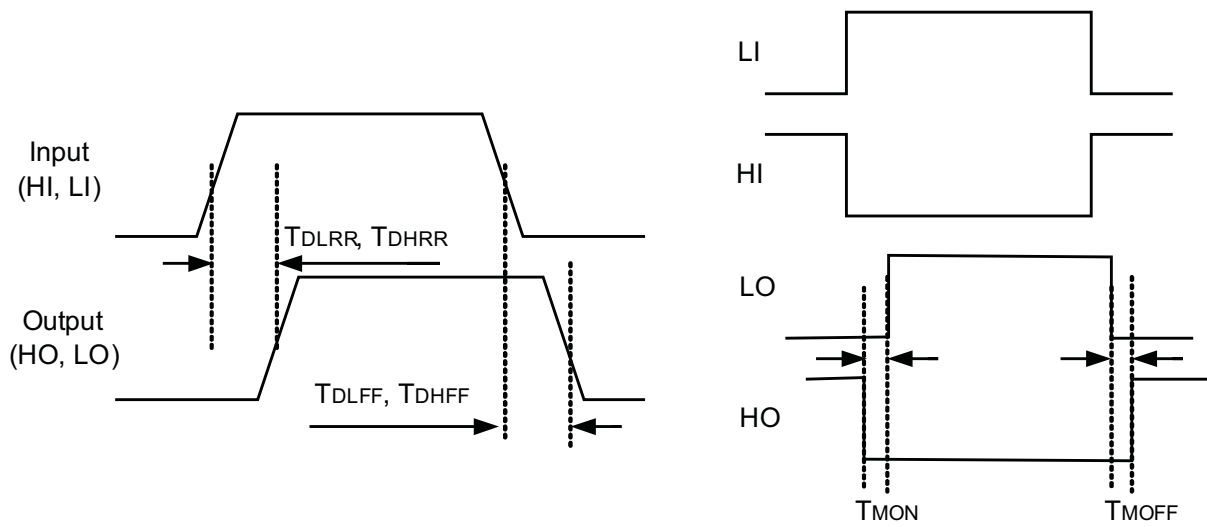


Figure 1. Timing Diagram

6.6 Typical Characteristics

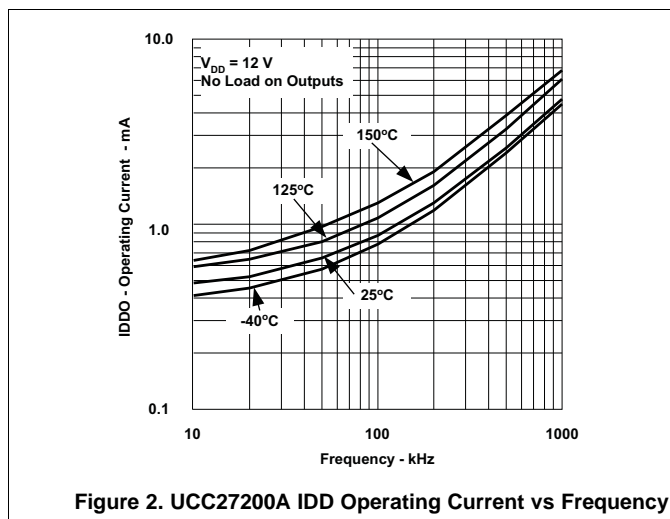


Figure 2. UCC27200A IDD Operating Current vs Frequency

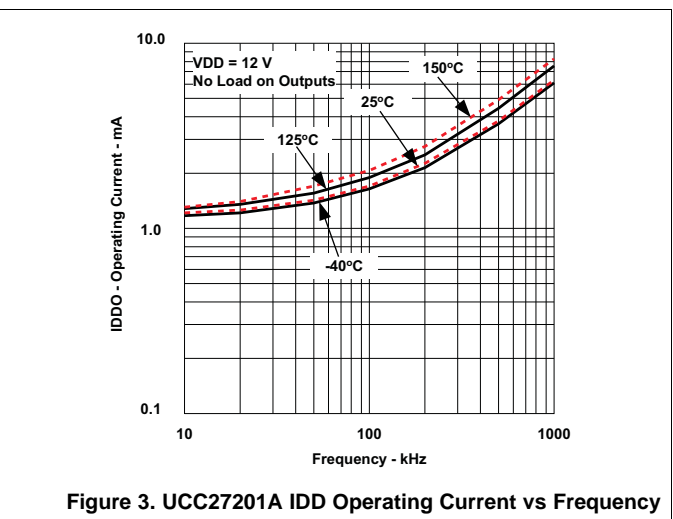


Figure 3. UCC27201A IDD Operating Current vs Frequency

Typical Characteristics (continued)

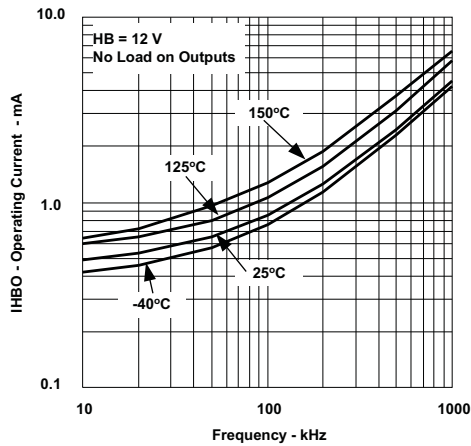


Figure 4. Boot Voltage Operating Current vs Frequency

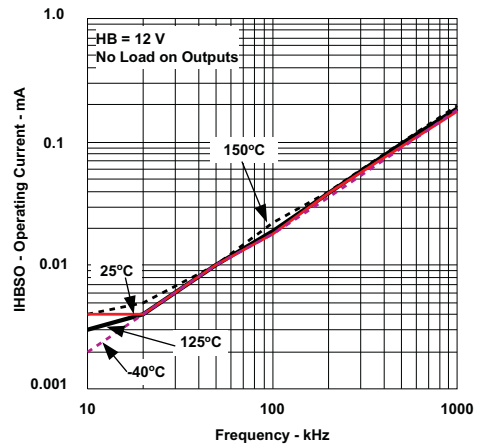


Figure 5. HB to VSS Operating Current vs Frequency

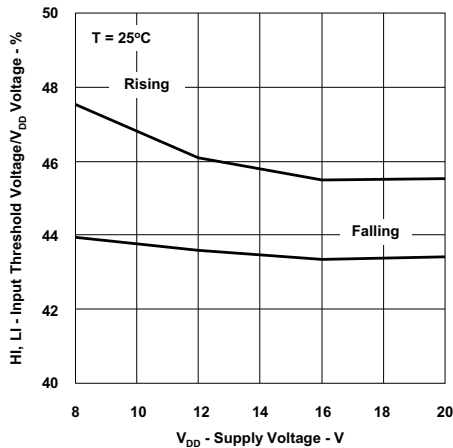


Figure 6. UCC27200A Input Threshold vs Supply Voltage

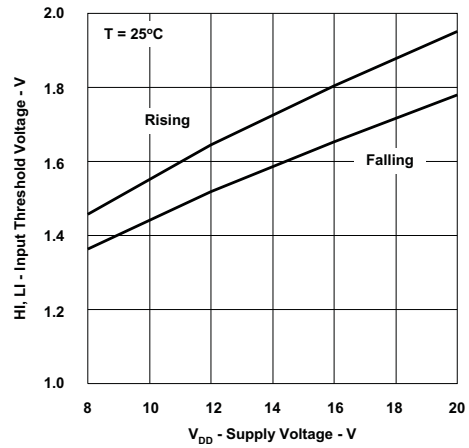


Figure 7. UCC27201A Input Threshold vs Supply Voltage

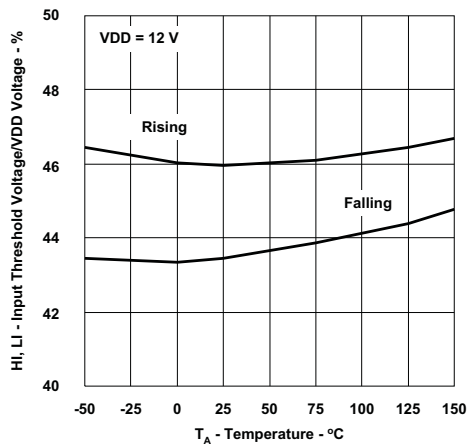


Figure 8. UCC27200A Input Threshold vs Temperature

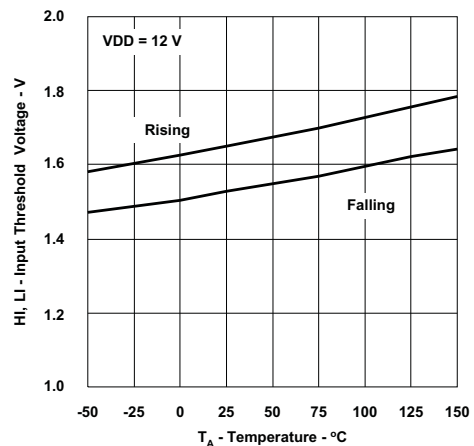


Figure 9. UCC27201A Input Threshold vs Temperature

Typical Characteristics (continued)

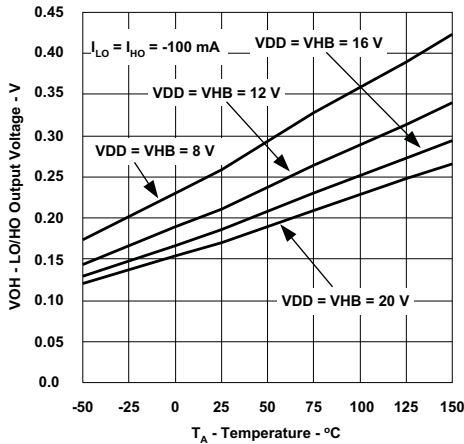


Figure 10. Lo and Ho High Level Output Voltage vs Temperature

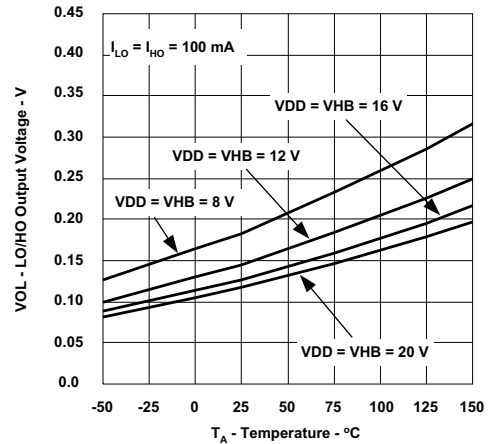


Figure 11. Lo and Ho Low Level Output Voltage vs Temperature

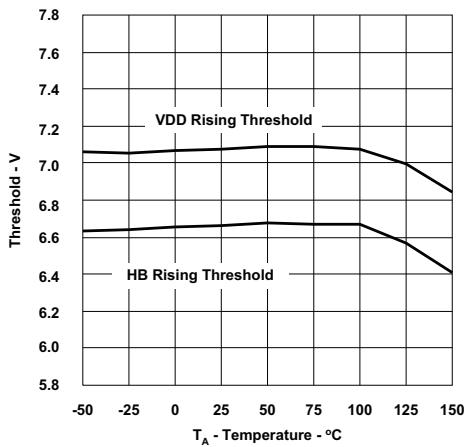


Figure 12. Undervoltage Lockout Threshold vs Temperature

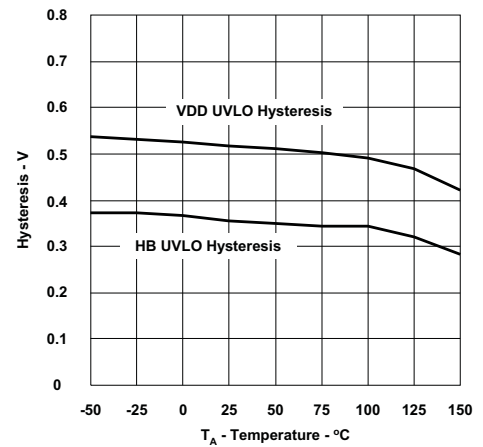


Figure 13. Undervoltage Lockout Threshold Hysteresis vs Temperature

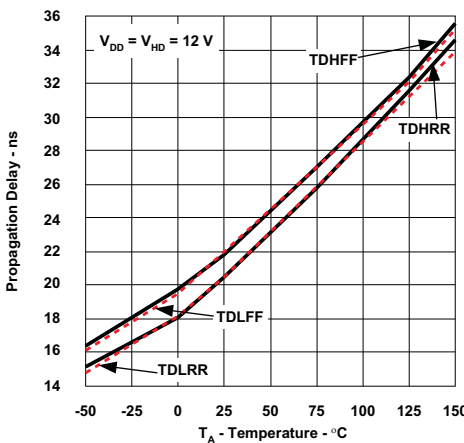


Figure 14. UCC27200A Propagation Delays vs Temperature

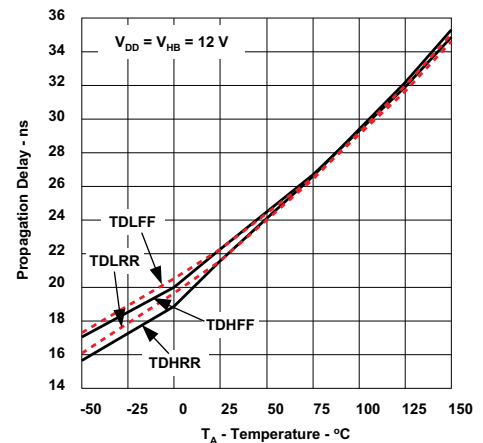


Figure 15. UCC27201A Propagation Delays vs Temperature

Typical Characteristics (continued)

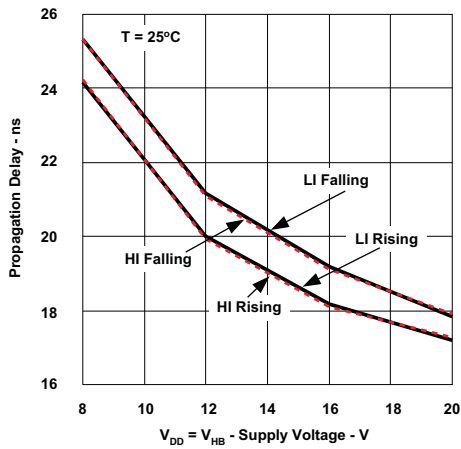


Figure 16. UCC27200A Propagation Delay vs Supply Voltage

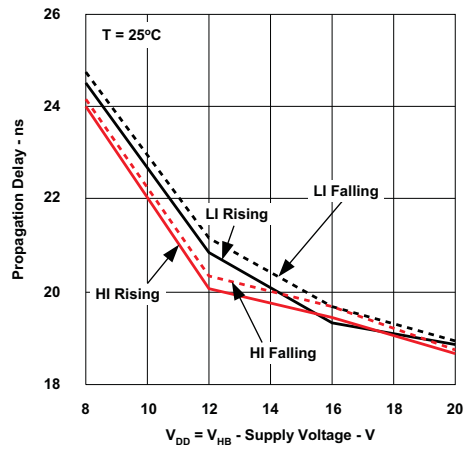


Figure 17. UCC27201A Propagation Delay vs Supply Voltage

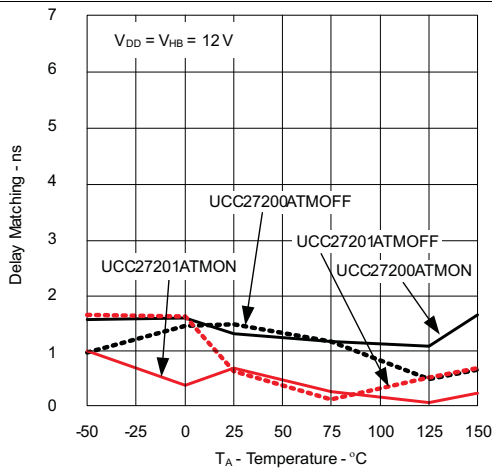


Figure 18. Delay Matching vs Temperature

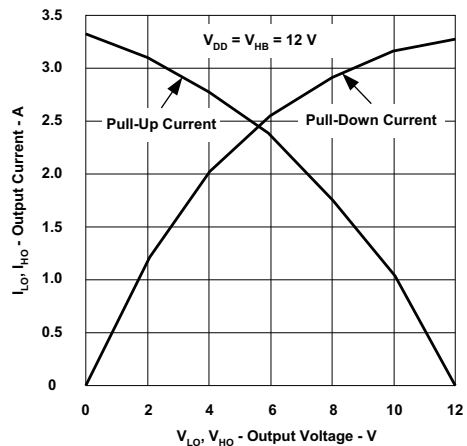


Figure 19. Output Current vs Output Voltage

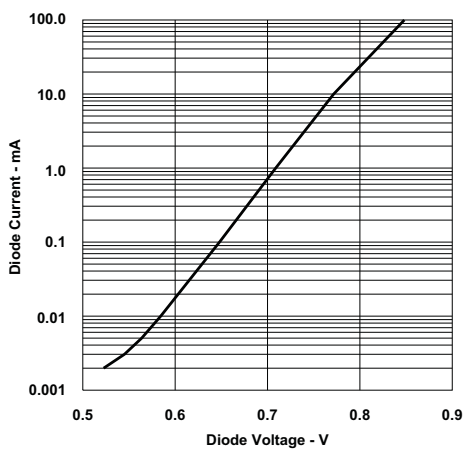


Figure 20. Diode Current vs Diode Voltage

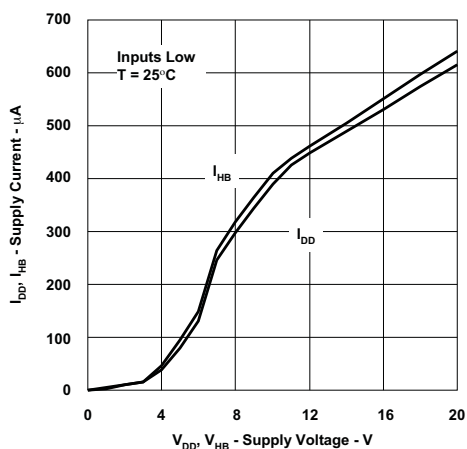


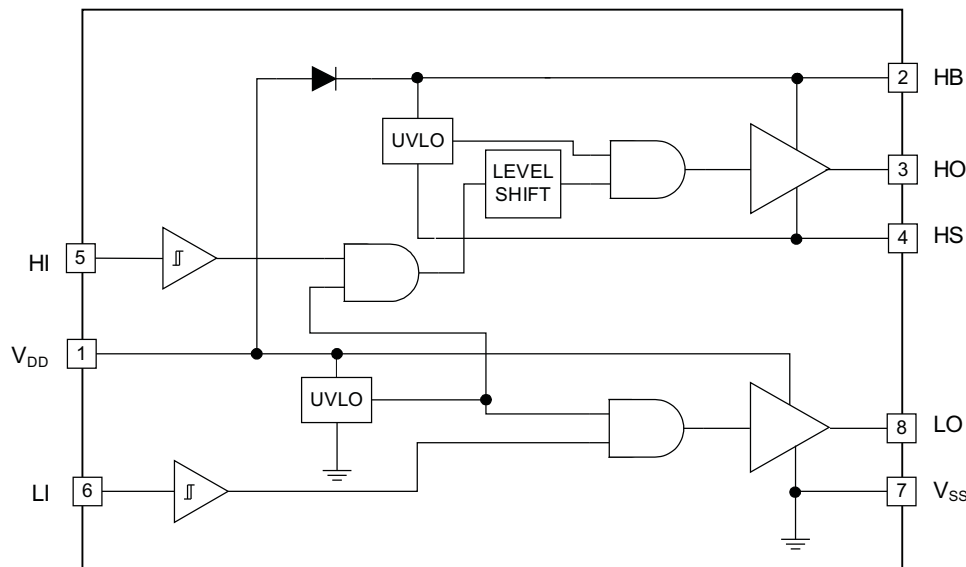
Figure 21. Quiescent Current vs Supply Voltage

7 Detailed Description

7.1 Overview

The UCC27200A and UCC27201A are high-side and low-side drivers. The high-side and low-side each have independent inputs which allow maximum flexibility of input control signals in the application. The boot diode for the high-side driver bias supply is internal to the UCC27200A and UCC27201A. The UCC27200A is the CMOS compatible input version and the UCC27201A is the TTL or logic compatible version. The high-side driver is referenced to the switch node (HS) which is typically the source pin of the high side MOSFET and drain pin of the low-side MOSFET. The low-side driver is referenced to VSS which is typically ground. The functions contained are the input stages, UVLO protection, level shift, boot diode, and output driver stages.

7.2 Functional Block Diagram



7.3 Feature Description

7.3.1 Input Stages

The input stages provide the interface to the PWM output signals. The input impedance of the UCC27200A is 200 k Ω nominal and input capacitance is approximately 2 pF. The 200 k Ω is a pulldown resistance to VSS (ground). The CMOS-compatible input of the UCC27200A provides a rising threshold of 48% of VDD and falling threshold of 45% of VDD. The inputs of the UCC27200A are intended to be driven from 0 to VDD levels.

The input stages of the UCC27201A incorporate an open-drain configuration to provide the lower input thresholds. The input impedance is 200 k Ω nominal and input capacitance is approximately 4 pF. The 200 k Ω is a pulldown resistance to VSS (ground). The logic level compatible input provides a rising threshold of 1.7 V and a falling threshold of 1.6 V.

7.3.1.1 UVLO (Undervoltage Lockout)

The bias supplies for the high-side and low-side drivers have UVLO protection. VDD as well as VHB to VHS differential voltages are monitored. The VDD UVLO disables both drivers when VDD is below the specified threshold. The rising VDD threshold is 7.1 V with 0.5-V hysteresis. The VHB UVLO disables only the high-side driver when the VHB to VHS differential voltage is below the specified threshold. The VHB UVLO rising threshold is 6.7 V with 0.4-V hysteresis.

Feature Description (continued)

7.3.1.2 Level Shift

The level shift circuit is the interface from the high-side input to the high-side driver stage which is referenced to the switch node (HS). The level shift allows control of the HO output referenced to the HS pin and provides excellent delay matching with the low-side driver.

7.3.1.3 Boot Diode

The boot diode necessary to generate the high-side bias is included in the UCC2720x family of drivers. The diode anode is connected to VDD and cathode connected to VHB. With the VHB capacitor connected to HB and the HS pins, the VHB capacitor charge is refreshed every switching cycle when HS transitions to ground. The boot diode provides fast recovery times, low diode resistance, and voltage rating margin to allow for efficient and reliable operation.

7.3.1.4 Output Stages

The output stages are the interface to the power MOSFETs in the power train. High slew rate, low resistance, and high peak current capability of both output drivers allow for efficient switching of the power MOSFETs. The low-side output stage is referenced from VDD to VSS and the high-side is referenced from VHB to VHS.

7.4 Device Functional Modes

The device operates in normal mode and VULO mode. See [UVLO \(Undervoltage Lockout\)](#) for more information on UVLO operation mode. In normal mode, the output stage is dependent on the states of the HI and LI pins.

Table 1. Device Logic Table

| HI PIN | LI PIN | HO ⁽¹⁾ | LO ⁽²⁾ |
|--------|--------|-------------------|-------------------|
| L | L | L | L |
| L | H | L | H |
| H | L | H | L |
| H | H | H | H |

- (1) HO is measured with respect to the HS.
 (2) LO is measured with respect to the VSS.

8 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.

8.1 Application Information

To effect fast switching of power devices and reduce associated switching power losses, a powerful gate driver is employed between the PWM output of controllers and the gates of the power semiconductor devices. Also, gate drivers are indispensable when it is impossible for the PWM controller to directly drive the gates of the switching devices. With the advent of digital power, this situation will be often encountered because the PWM signal from the digital controller is often a 3.3-V logic signal which cannot effectively turn on a power switch. Level shifting circuitry is needed to boost the 3.3-V signal to the gate-drive voltage (such as 12 V) in order to fully turn on the power device and minimize conduction losses. Traditional buffer drive circuits based on NPN/PNP bipolar transistors in totem-pole arrangement, being emitter follower configurations, prove inadequate with digital power because they lack level-shifting capability. Gate drivers effectively combine both the level-shifting and buffer-drive functions. Gate drivers also find other needs such as minimizing the effect of high-frequency switching noise by locating the high-current driver physically close to the power switch, driving gate-drive transformers and controlling floating power-device gates, reducing power dissipation and thermal stress in controllers by moving gate charge power losses from the controller into the driver.

8.2 Typical Application

An open loop half-bridge converter was used to calculate performance in an actual application.

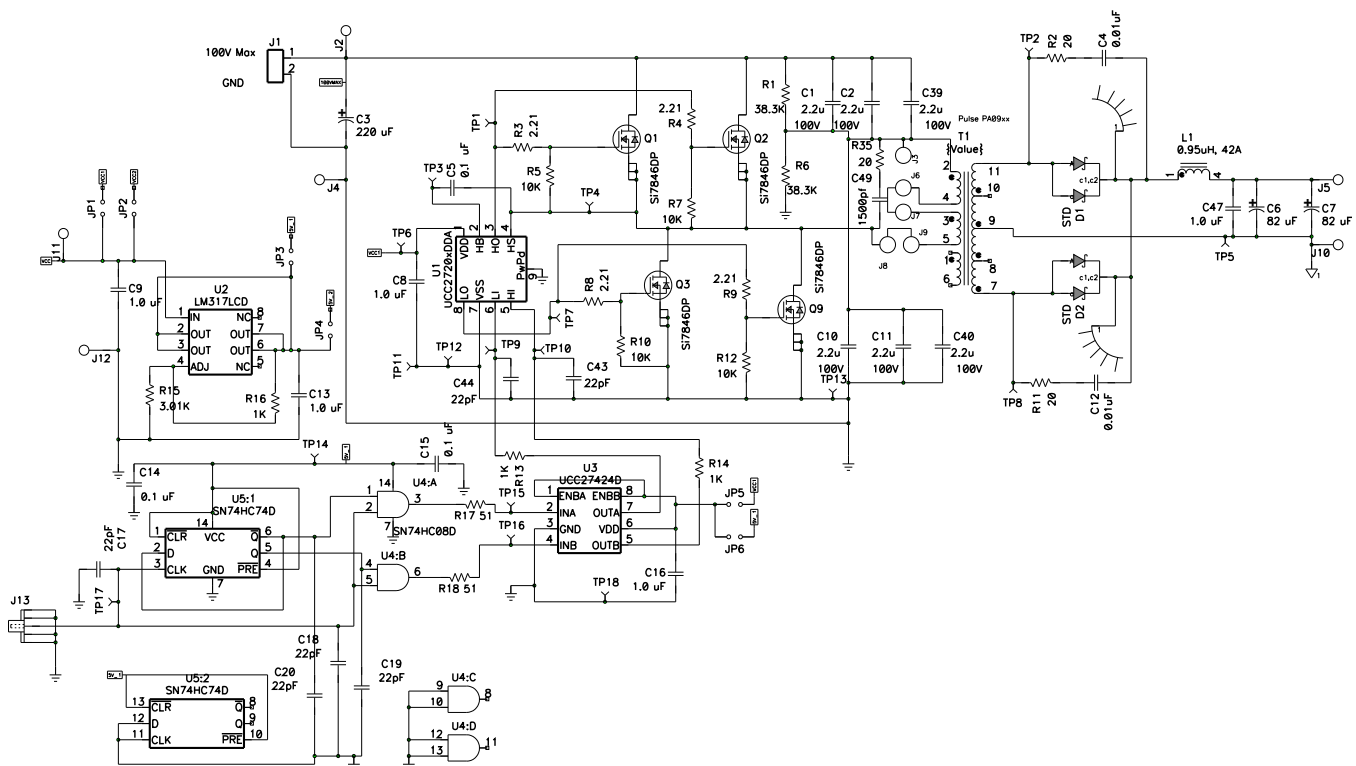
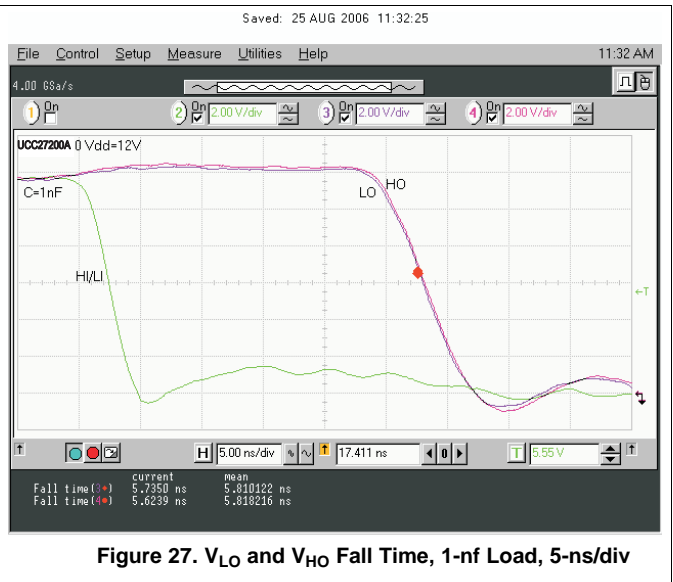
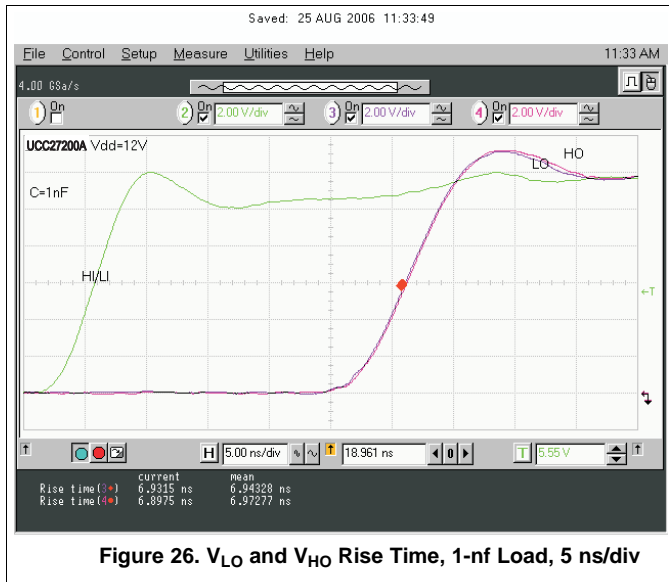


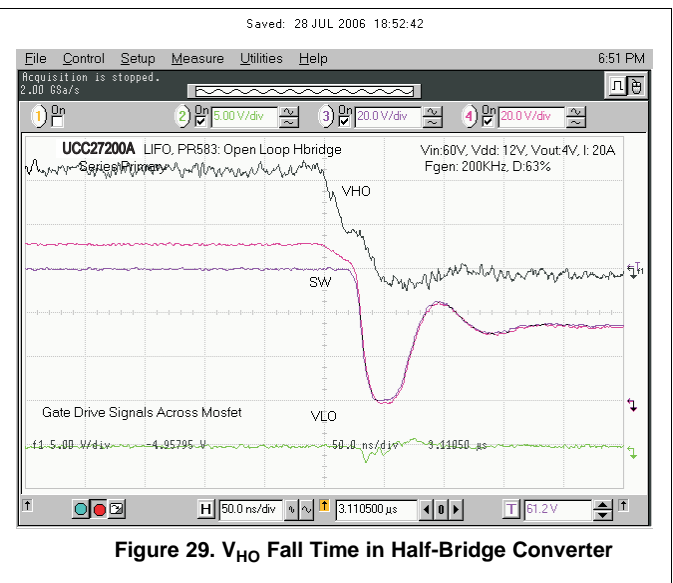
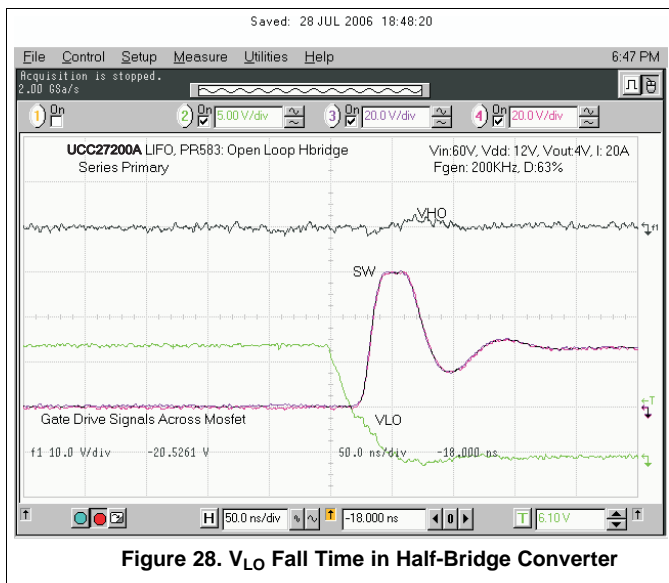
Figure 22. Open Loop Half-Bridge Converter

Actual measured waveforms are shown in Figure 26 and Figure 27. As shown, the typical rise time of 8 ns and fall time of 7 ns is conservatively rated.



8.2.2.2 Dynamic Switching of the MOSFETs

The true behavior of MOSFETs presents a dynamic capacitive load primarily at the gate to source threshold voltage. Using the turnoff case as the example, when the gate to source threshold voltage is reached the drain voltage starts rising, the drain to gate parasitic capacitance couples charge into the gate resulting in the turn off plateau. The relatively low threshold voltages of many MOSFETs and the increased charge that has to be removed (Miller charge) makes good driver performance necessary for efficient switching. An open-loop, half-bridge power converter was utilized to evaluate performance in actual applications. The schematic of the half-bridge converter is shown in . The turn off waveforms of the UCC27200A driving two MOSFETs in parallel is shown in Figure 28 and Figure 29.



8.2.2.3 Delay Matching and Narrow Pulse Widths

The total delays encountered in the PWM, driver and power stage need to be considered for a number of reasons, primarily delay in current limit response. Also to be considered are differences in delays between the drivers which can lead to various concerns depending on the topology. The sync-buck topology switching requires careful selection of dead-time between the high- and low-side switches to avoid 1) cross conduction and 2) excessive body diode conduction. Bridge topologies can be affected by a resulting volt-sec imbalance on the transformer if there is imbalance in the high and low side pulse widths in a steady-state condition.

Narrow pulse width performance is an important consideration when transient and short circuit conditions are encountered. Although there may be relatively long steady state PWM output-driver-MOSFET signals, very narrow pulses may be encountered in 1) soft start, 2) large load transients, and 3) short circuit conditions.

The UCC2720x driver family offers excellent performance regarding high and low-side driver delay matching and narrow pulse width performance. The delay matching waveforms are shown in [Figure 30](#) and [Figure 31](#). The UCC2720x driver narrow pulse performance is shown in [Figure 32](#) and [Figure 33](#).

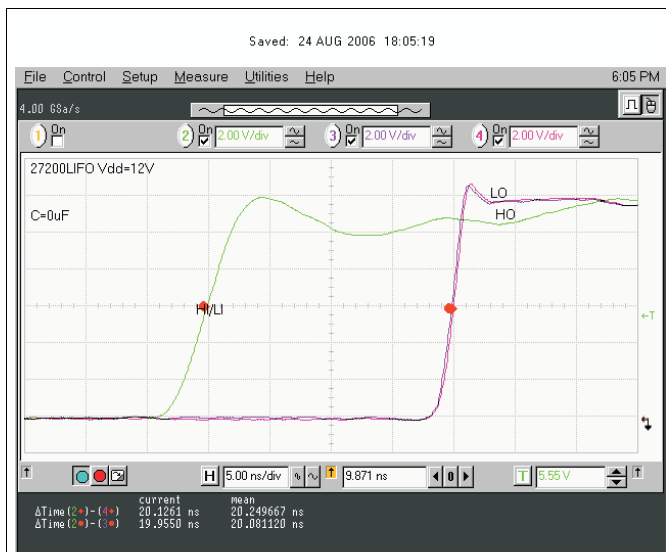


Figure 30. V_{LO} and V_{HO} Rising Edge Delay Matching

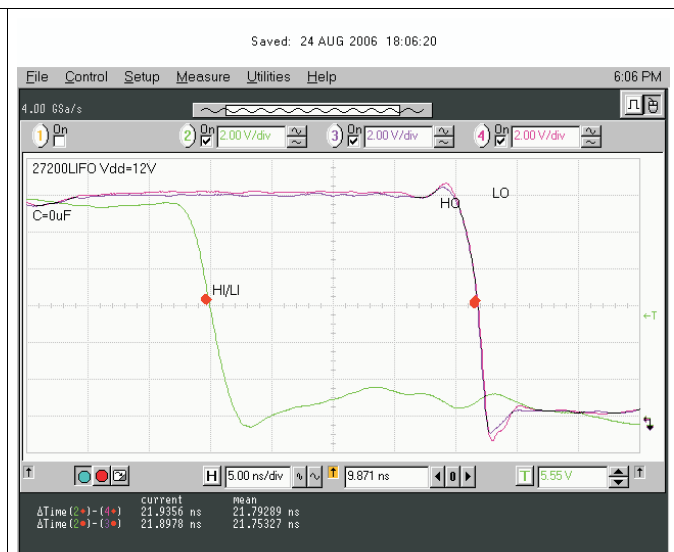


Figure 31. V_{LO} and V_{HO} Falling Edge Delay Matching



Figure 32. 20-ns Input Pulse Delay Matching

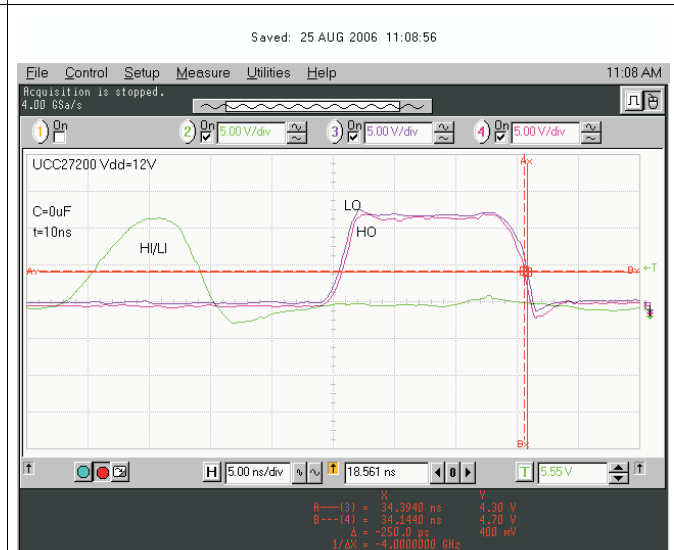


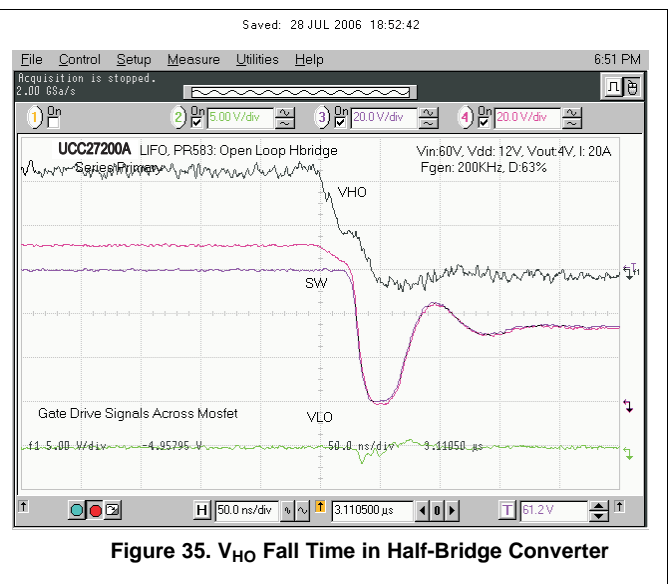
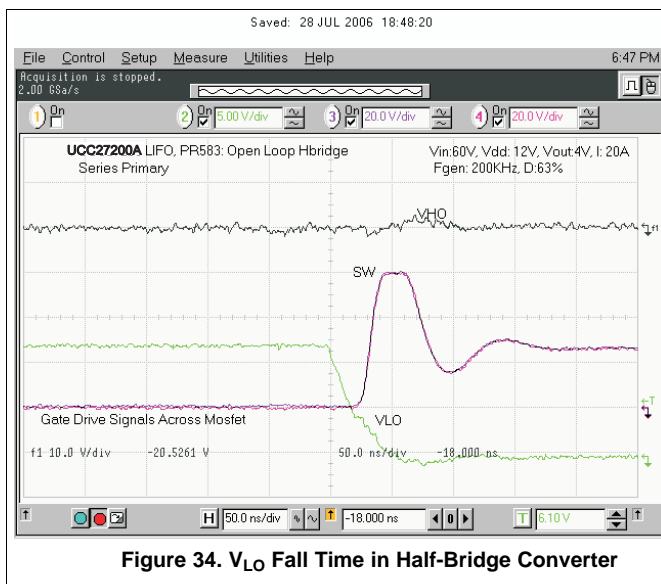
Figure 33. 10-ns Input Pulse Delay Matching

8.2.2.4 Boot Diode Performance

The UCC2720x family of drivers incorporates the bootstrap diode necessary to generate the high-side bias internally. The characteristics of this diode are important to achieve efficient, reliable operation. The dc characteristics to consider are V_F and dynamic resistance. A low V_F and high dynamic resistance results in a high forward voltage during charging of the bootstrap capacitor. The UCC2720x has a boot diode rated at 0.65-V V_F and dynamic resistance of 0.6 Ω for reliable charge transfer to the bootstrap capacitor. The dynamic characteristics to consider are diode recovery time and stored charge. Diode recovery times that are specified with no conditions can be misleading. Diode recovery times at no forward current (I_F) can be noticeably less than with forward current applied. The UCC2720x boot diode recovery is specified at 20ns at $I_F = 20$ mA, $I_{REV} = 0.5$ A. At 0 mA I_F the reverse recovery time is 15 ns.

Another less obvious consideration is how the stored charge of the diode is affected by applied voltage. On every switching transition when the HS node transitions from low to high, charge is removed from the boot capacitor to charge the capacitance of the reverse biased diode. This is a portion of the driver power losses and reduces the voltage on the HB capacitor. At higher applied voltages, the stored charge of the UCC2720x PN diode is often less than a comparable Schottky diode.

8.2.3 Application Curves



9 Power Supply Recommendations

The bias supply voltage range for which the device is rated to operate is from 8 V to 17 V. The lower end of this range is governed by the internal undervoltage-lockout (UVLO) protection feature on the VDD pin supply circuit blocks. Whenever the driver is in UVLO condition when the VDD pin voltage is below the V(ON) supply start threshold, this feature holds the output low, regardless of the status of the inputs. The upper end of this range is driven by the 20-V absolute maximum voltage rating of the VDD pin of the device (which is a stress rating). Keeping a 3-V margin to allow for transient voltage spikes, the maximum recommended voltage for the VDD pin is 17 V. The UVLO protection feature also involves a hysteresis function. This means that when the VDD pin bias voltage has exceeded the threshold voltage and device begins to operate, and if the voltage drops, then the device continues to deliver normal functionality unless the voltage drop exceeds the hysteresis specification VDD(hys). Therefore, ensuring that, while operating at or near the 8-V range, the voltage ripple on the auxiliary power supply output is smaller than the hysteresis specification of the device is important to avoid triggering device shutdown. During system shutdown, the device operation continues until the VDD pin voltage has dropped below the V(OFF) threshold which must be accounted for while evaluating system shutdown timing design requirements. Likewise, at system startup, the device does not begin operation until the VDD pin voltage has exceeded above the V(ON) threshold. The quiescent current consumed by the internal circuit blocks of the device is supplied through the VDD pin. Although this fact is well known, recognizing that the charge for source current pulses delivered by the HO pin is also supplied through the same VDD pin is important. As a result, every time a current is sourced out of the HO pin a corresponding current pulse is delivered into the device through the VDD pin. Thus ensuring that a local bypass capacitor is provided between the VDD and GND pins and located as close to the device as possible for the purpose of decoupling is important. A low ESR, ceramic surface mount capacitor is a must. TI recommends using a capacitor in the range 0.22 μ F to 4.7 μ F between VDD and GND. In a similar manner, the current pulses delivered by the LO pin are sourced from the HB pin. Therefore a 0.022- μ F to 0.1- μ F local decoupling capacitor is recommended between the HB and HS pins.

10 Layout

10.1 Layout Guidelines

To improve the switching characteristics and efficiency of a design, the following layout rules should be followed.

- Locate the driver as close as possible to the MOSFETs.
- Locate the V_{DD} and V_{HB} (bootstrap) capacitors as close as possible to the driver.
- Pay close attention to the GND trace. Use the thermal pad of the DDA and DRM package as GND by connecting it to the VSS pin (GND). The GND trace from the driver goes directly to the source of the MOSFET but should not be in the high current path of the MOSFET(S) drain or source current.
- Use similar rules for the HS node as for GND for the high side driver.
- Use wide traces for LO and HO closely following the associated GND or HS traces. 60 mil to 100 mil width is preferable where possible.
- Use as least two or more vias if the driver outputs or SW node needs to be routed from one layer to another. For GND the number of vias needs to be a consideration of the thermal pad requirements as well as parasitic inductance.
- Avoid L_I and H_I (driver input) going close to the HS node or any other high dV/dT traces that can induce significant noise into the relatively high impedance leads.
- Keep in mind that a poor layout can cause a significant drop in efficiency versus a good PCB layout and can even lead to decreased reliability of the whole system.

These references and links to additional information may be found at www.ti.com.

1. Additional layout guidelines for PCB land patterns may be found in Application Brief [SLUA271](#)
2. Additional thermal performance guidelines may be found in Application Reports [SLMA002](#) and [SLMA004](#)

10.2 Layout Example

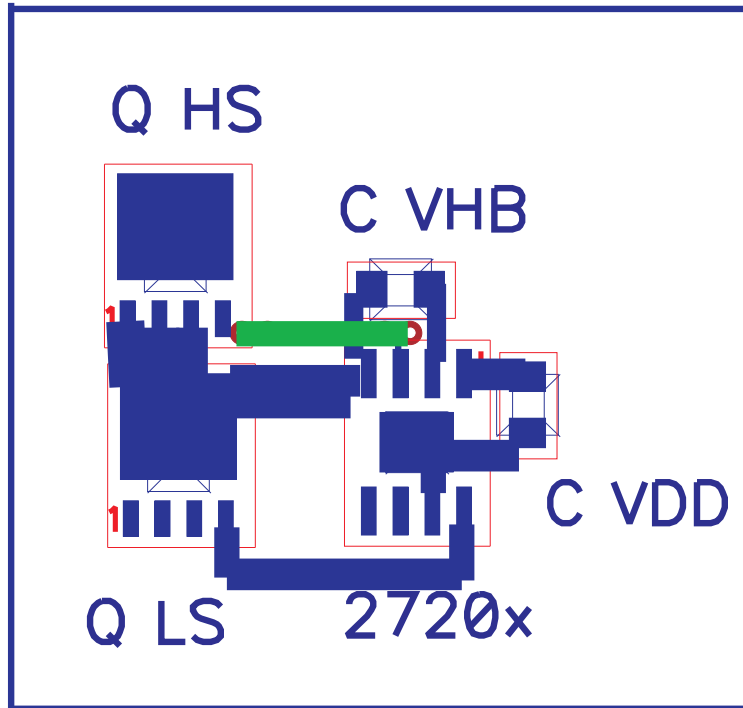


Figure 36. Example Component Placement

11 器件和文档支持

11.1 文档支持

11.1.1 相关文档

相关文档如下：

- 《QFN/SON PCB 连接》， [SLUA271](#)
- 《PowerPAD 耐热增强型封装》， [SLMA002](#)
- 《PowerPAD 速成》， [SLMA004](#)

11.2 相关链接

下面的表格中列出了快速访问链接。范围包括技术文档、支持与社区资源、工具和软件，并且可以快速访问样片或购买链接。

表 2. 相关链接

| 器件 | 产品文件夹 | 样片与购买 | 技术文章 | 工具与软件 | 支持与社区 |
|-----------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| UCC27200A | 请单击此处 | 请单击此处 | 请单击此处 | 请单击此处 | 请单击此处 |
| UCC27201A | 请单击此处 | 请单击此处 | 请单击此处 | 请单击此处 | 请单击此处 |

11.3 社区资源

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.

11.4 商标

PowerPAD, E2E are trademarks of Texas Instruments.
All other trademarks are the property of their respective owners.

11.5 静电放电警告



这些装置包含有限的内置 ESD 保护。存储或装卸时，应将导线一起截短或将装置放置于导电泡棉中，以防止 MOS 门极遭受静电损伤。

11.6 Glossary

[SLYZ022](#) — *TI Glossary*.

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

12 机械、封装和可订购信息

以下页中包括机械、封装和可订购信息。这些信息是针对指定器件可提供的最新数据。这些数据会在无通知且不对本文档进行修订的情况下发生改变。欲获得该数据表的浏览器版本，请查阅左侧的导航栏。

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 |
|------------------|---------------|--------------|-----------------|------|-------------|-----------------|--------------------------------------|----------------------|--------------|-------------------------|---------|
| UCC27200AD | LIFEBUY | SOIC | D | 8 | 75 | RoHS & Green | NIPDAU | Level-1-260C-UNLIM | -40 to 140 | 27200A | |
| UCC27200ADDA | LIFEBUY | SO PowerPAD | DDA | 8 | 75 | RoHS & Green | NIPDAU NIPDAUAG | Level-1-260C-UNLIM | -40 to 140 | 27200A | |
| UCC27200ADDAR | ACTIVE | SO PowerPAD | DDA | 8 | 2500 | RoHS & Green | NIPDAU NIPDAUAG | Level-1-260C-UNLIM | -40 to 140 | 27200A | Samples |
| UCC27200ADR | ACTIVE | SOIC | D | 8 | 2500 | RoHS & Green | NIPDAU | Level-1-260C-UNLIM | -40 to 140 | 27200A | Samples |
| UCC27200ADRCR | ACTIVE | VSON | DRC | 9 | 3000 | RoHS & Green | NIPDAU | Level-2-260C-1 YEAR | -40 to 140 | 200A | Samples |
| UCC27200ADRCT | LIFEBUY | VSON | DRC | 9 | 250 | RoHS & Green | NIPDAU | Level-2-260C-1 YEAR | -40 to 140 | 200A | |
| UCC27200ADRM | ACTIVE | VSON | DRM | 8 | 3000 | RoHS & Green | NIPDAUAG | Level-1-260C-UNLIM | -40 to 140 | 27200A | Samples |
| UCC27200ADRMT | LIFEBUY | VSON | DRM | 8 | 250 | RoHS & Green | NIPDAUAG | Level-1-260C-UNLIM | -40 to 140 | 27200A | |
| UCC27201AD | LIFEBUY | SOIC | D | 8 | 75 | RoHS & Green | NIPDAU | Level-1-260C-UNLIM | -40 to 140 | 27201A | |
| UCC27201ADDA | LIFEBUY | SO PowerPAD | DDA | 8 | 75 | RoHS & Green | NIPDAU NIPDAUAG | Level-1-260C-UNLIM | -40 to 140 | 27201A | |
| UCC27201ADDAR | ACTIVE | SO PowerPAD | DDA | 8 | 2500 | RoHS & Green | NIPDAU NIPDAUAG | Level-1-260C-UNLIM | -40 to 140 | 27201A | Samples |
| UCC27201ADPRR | ACTIVE | WSON | DPR | 10 | 3000 | RoHS & Green | NIPDAU | Level-1-260C-UNLIM | -40 to 140 | UCC 27201A | Samples |
| UCC27201ADPRT | LIFEBUY | WSON | DPR | 10 | 250 | RoHS & Green | NIPDAU | Level-1-260C-UNLIM | -40 to 140 | UCC 27201A | |
| UCC27201ADR | ACTIVE | SOIC | D | 8 | 2500 | RoHS & Green | NIPDAU | Level-1-260C-UNLIM | -40 to 140 | 27201A | Samples |
| UCC27201ADRCR | ACTIVE | VSON | DRC | 9 | 3000 | RoHS & Green | NIPDAU | Level-1-260C-UNLIM | -40 to 140 | 201A | Samples |
| UCC27201ADRCT | LIFEBUY | VSON | DRC | 9 | 250 | RoHS & Green | NIPDAU | Level-2-260C-1 YEAR | -40 to 140 | 201A | |
| UCC27201ADRM | ACTIVE | VSON | DRM | 8 | 3000 | RoHS & Green | NIPDAU NIPDAUAG | Level-1-260C-UNLIM | -40 to 140 | 27201A | Samples |
| UCC27201ADRMT | LIFEBUY | VSON | DRM | 8 | 250 | RoHS & Green | NIPDAU NIPDAUAG | Level-1-260C-UNLIM | -40 to 140 | 27201A | |

(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) **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 ≤ 1000 ppm threshold. Antimony trioxide based flame retardants must also meet the ≤ 1000 ppm 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.

Important Information and Disclaimer: The information provided on this page represents TI's knowledge and belief as of the date that it is provided. TI bases its knowledge and belief on information provided by third parties, and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. TI has taken and continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. TI and TI suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.

In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

OTHER QUALIFIED VERSIONS OF UCC27201A :

- Automotive : [UCC27201A-Q1](#)

NOTE: Qualified Version Definitions:

- Automotive - Q100 devices qualified for high-reliability automotive applications targeting zero defects

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 |
|---------------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| UCC27200ADDAR | SO PowerPAD | DDA | 8 | 2500 | 330.0 | 12.4 | 6.4 | 5.2 | 2.1 | 8.0 | 12.0 | Q1 |
| UCC27200ADR | SOIC | D | 8 | 2500 | 330.0 | 12.5 | 6.4 | 5.2 | 2.1 | 8.0 | 12.0 | Q1 |
| UCC27200ADRCR | VSON | DRC | 9 | 3000 | 330.0 | 12.4 | 3.3 | 3.3 | 1.1 | 8.0 | 12.0 | Q2 |
| UCC27200ADRCT | VSON | DRC | 9 | 250 | 180.0 | 12.4 | 3.3 | 3.3 | 1.1 | 8.0 | 12.0 | Q2 |
| UCC27200ADRM | VSON | DRM | 8 | 3000 | 330.0 | 12.4 | 4.25 | 4.25 | 1.15 | 8.0 | 12.0 | Q2 |
| UCC27200ADRMT | VSON | DRM | 8 | 250 | 180.0 | 12.4 | 4.25 | 4.25 | 1.15 | 8.0 | 12.0 | Q2 |
| UCC27201ADDAR | SO PowerPAD | DDA | 8 | 2500 | 330.0 | 12.8 | 6.4 | 5.2 | 2.1 | 8.0 | 12.0 | Q1 |
| UCC27201ADPRR | WSON | DPR | 10 | 3000 | 330.0 | 12.4 | 4.25 | 4.25 | 1.15 | 8.0 | 12.0 | Q2 |
| UCC27201ADPRT | WSON | DPR | 10 | 250 | 180.0 | 12.4 | 4.25 | 4.25 | 1.15 | 8.0 | 12.0 | Q2 |
| UCC27201ADR | SOIC | D | 8 | 2500 | 330.0 | 12.5 | 6.4 | 5.2 | 2.1 | 8.0 | 12.0 | Q1 |
| UCC27201ADRCR | VSON | DRC | 9 | 3000 | 330.0 | 12.4 | 3.3 | 3.3 | 1.1 | 8.0 | 12.0 | Q2 |
| UCC27201ADRCT | VSON | DRC | 9 | 250 | 180.0 | 12.4 | 3.3 | 3.3 | 1.1 | 8.0 | 12.0 | Q2 |
| UCC27201ADRM | VSON | DRM | 8 | 3000 | 330.0 | 12.4 | 4.25 | 4.25 | 1.15 | 8.0 | 12.0 | Q2 |
| UCC27201ADRMT | VSON | DRM | 8 | 250 | 180.0 | 12.4 | 4.25 | 4.25 | 1.15 | 8.0 | 12.0 | Q2 |

TAPE AND REEL BOX DIMENSIONS


*All dimensions are nominal

| Device | Package Type | Package Drawing | Pins | SPQ | Length (mm) | Width (mm) | Height (mm) |
|---------------|--------------|-----------------|------|------|-------------|------------|-------------|
| UCC27200ADDAR | SO PowerPAD | DDA | 8 | 2500 | 356.0 | 356.0 | 35.0 |
| UCC27200ADR | SOIC | D | 8 | 2500 | 340.5 | 338.1 | 20.6 |
| UCC27200ADRCR | VSON | DRC | 9 | 3000 | 346.0 | 346.0 | 33.0 |
| UCC27200ADRCT | VSON | DRC | 9 | 250 | 210.0 | 185.0 | 35.0 |
| UCC27200ADRMR | VSON | DRM | 8 | 3000 | 356.0 | 356.0 | 35.0 |
| UCC27200ADRMT | VSON | DRM | 8 | 250 | 210.0 | 185.0 | 35.0 |
| UCC27201ADDAR | SO PowerPAD | DDA | 8 | 2500 | 364.0 | 364.0 | 27.0 |
| UCC27201ADPRR | WSON | DPR | 10 | 3000 | 346.0 | 346.0 | 33.0 |
| UCC27201ADPRT | WSON | DPR | 10 | 250 | 182.0 | 182.0 | 20.0 |
| UCC27201ADR | SOIC | D | 8 | 2500 | 340.5 | 338.1 | 20.6 |
| UCC27201ADRCR | VSON | DRC | 9 | 3000 | 346.0 | 346.0 | 33.0 |
| UCC27201ADRCT | VSON | DRC | 9 | 250 | 210.0 | 185.0 | 35.0 |
| UCC27201ADRMR | VSON | DRM | 8 | 3000 | 367.0 | 367.0 | 35.0 |
| UCC27201ADRMT | VSON | DRM | 8 | 250 | 210.0 | 185.0 | 35.0 |

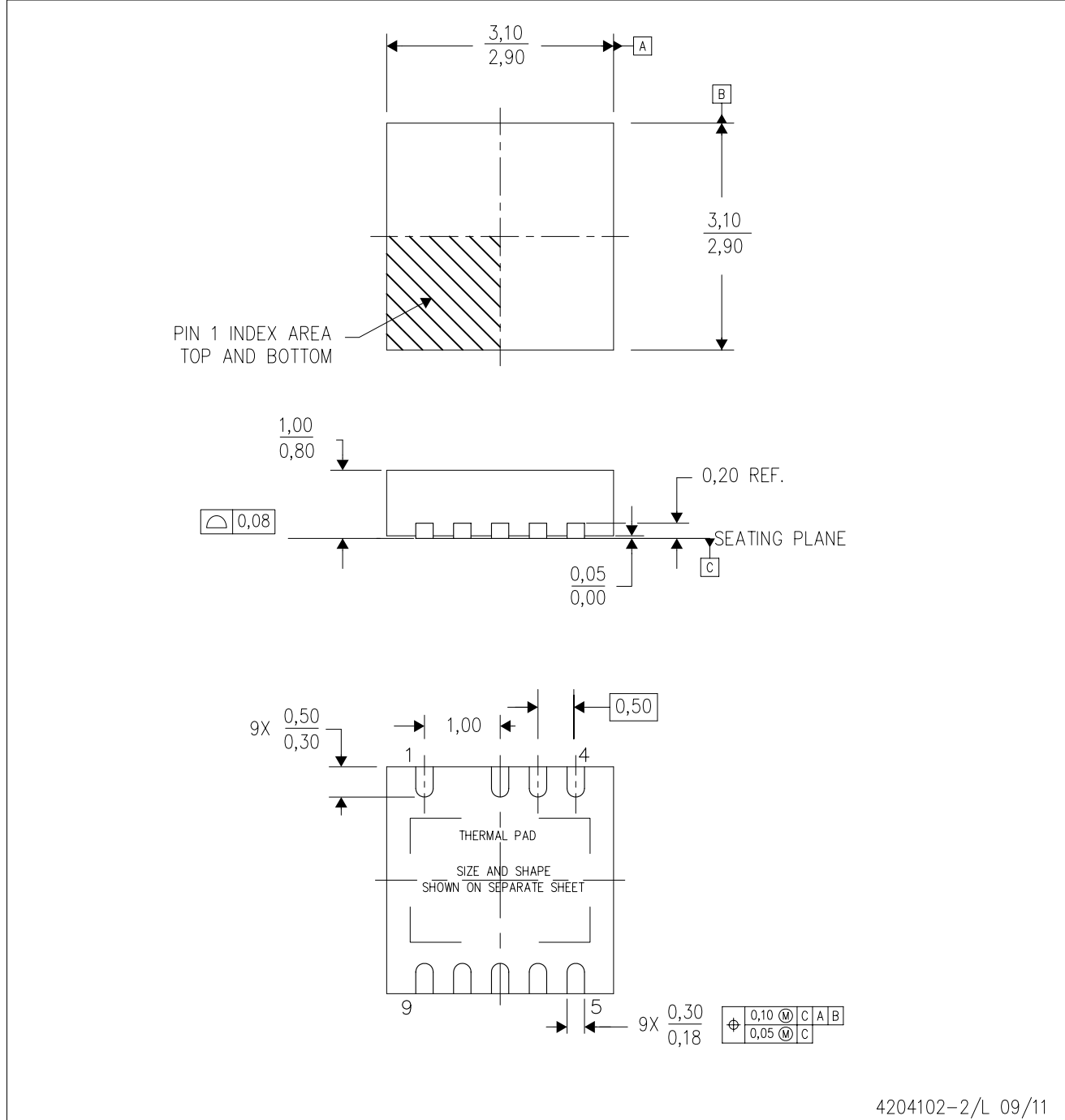
TUBE


*All dimensions are nominal

| Device | Package Name | Package Type | Pins | SPQ | L (mm) | W (mm) | T (μm) | B (mm) |
|--------------|--------------|--------------|------|-----|--------|--------|--------|--------|
| UCC27200AD | D | SOIC | 8 | 75 | 507 | 8 | 3940 | 4.32 |
| UCC27200ADDA | DDA | HSOIC | 8 | 75 | 517 | 7.87 | 635 | 4.25 |
| UCC27200ADDA | DDA | HSOIC | 8 | 75 | 506.6 | 8 | 3940 | 4.32 |
| UCC27201AD | D | SOIC | 8 | 75 | 507 | 8 | 3940 | 4.32 |
| UCC27201ADDA | DDA | HSOIC | 8 | 75 | 506.6 | 8 | 3940 | 4.32 |
| UCC27201ADDA | DDA | HSOIC | 8 | 75 | 517 | 7.87 | 635 | 4.25 |

DRC (S-PVSON-N9)

PLASTIC SMALL OUTLINE NO-LEAD



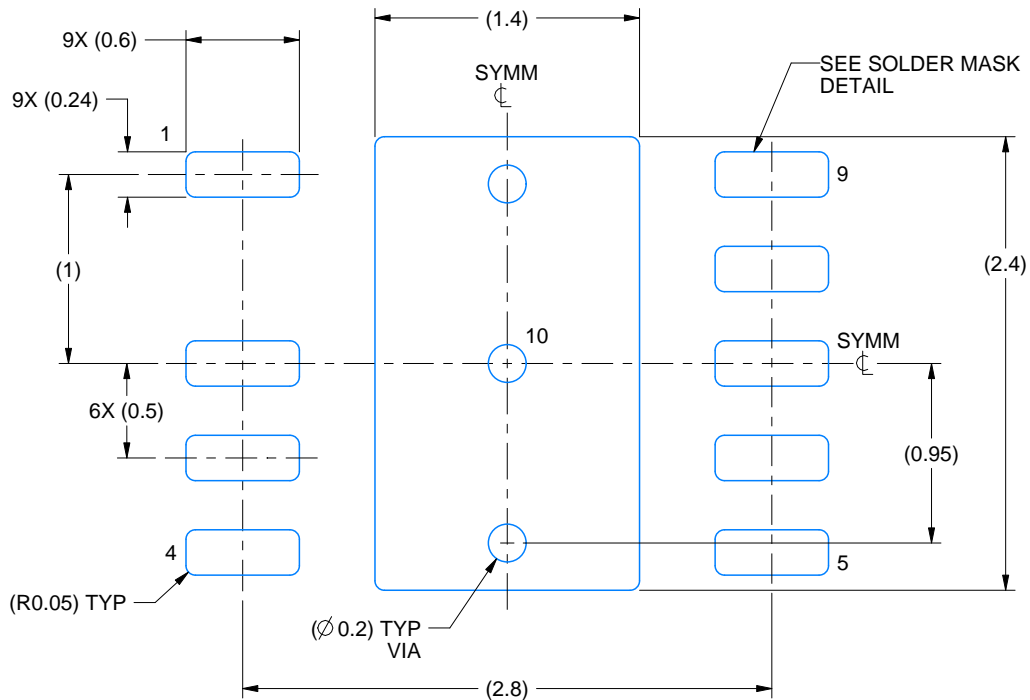
- NOTES:
- All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5M-1994.
 - This drawing is subject to change without notice.
 - Small Outline No-Lead (SON) package configuration.
 - The package thermal pad must be soldered to the board for thermal and mechanical performance, if present.
 - See the additional figure in the Product Data Sheet for details regarding the exposed thermal pad features and dimensions, if present

EXAMPLE BOARD LAYOUT

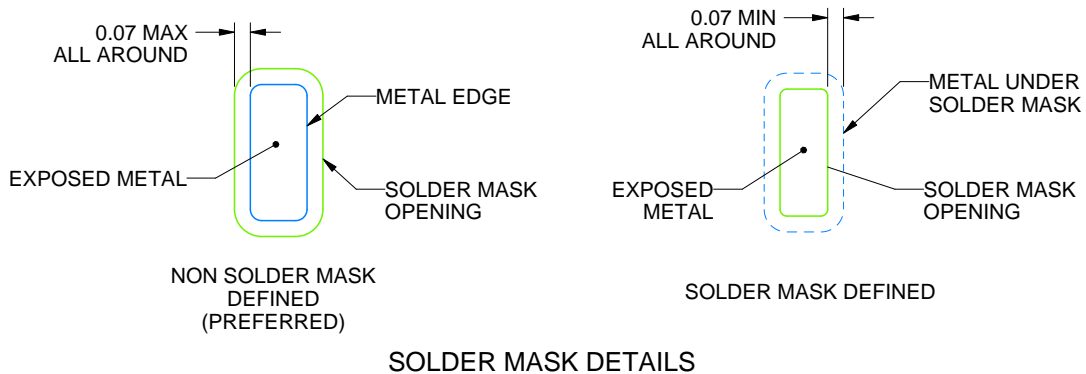
DRC0009A

VSON - 1 mm max height

PLASTIC SMALL OUTLINE - NO LEAD



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE: 25X



SOLDER MASK DETAILS

4229027/A 09/2022

NOTES: (continued)

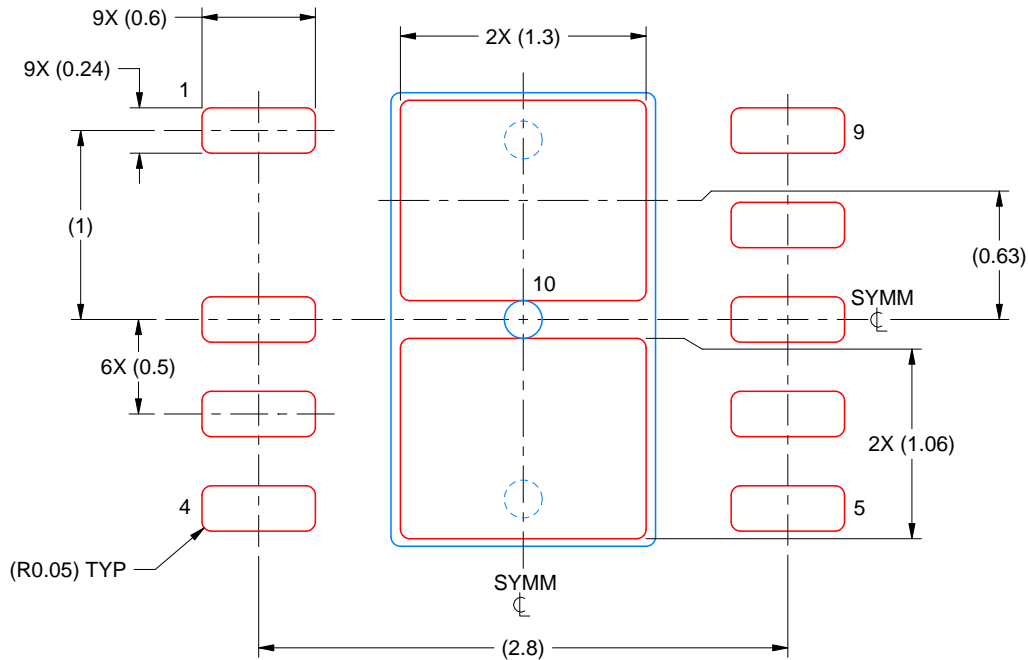
4. This package is designed to be soldered to a thermal pad on the board. For more information, see Texas Instruments literature number SLUA271 (www.ti.com/lit/slua271).
5. Vias are optional depending on application, refer to device data sheet. If any vias are implemented, refer to their locations shown on this view. It is recommended that vias under paste be filled, plugged or tented.

EXAMPLE STENCIL DESIGN

DRC0009A

VSON - 1 mm max height

PLASTIC SMALL OUTLINE - NO LEAD



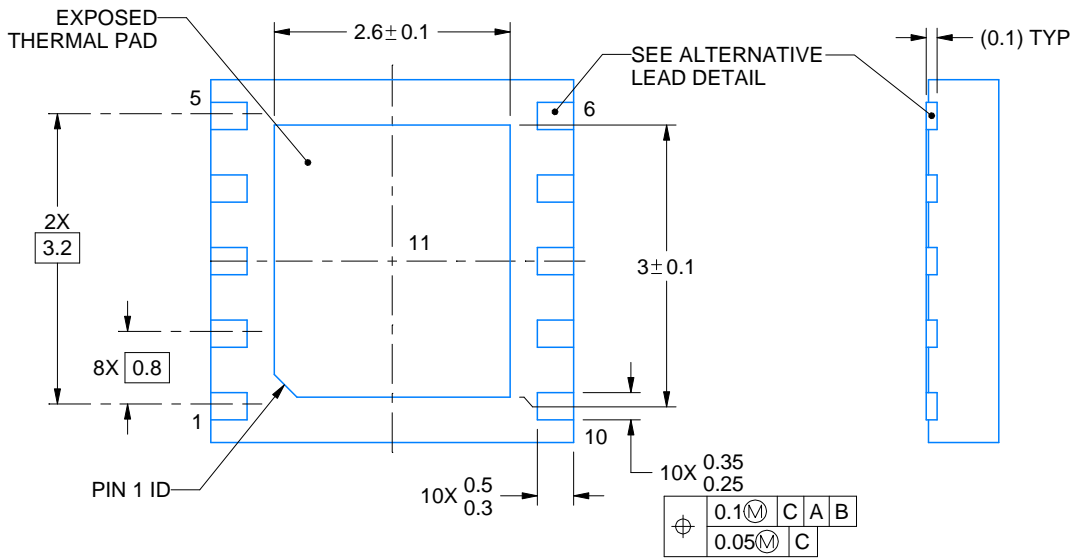
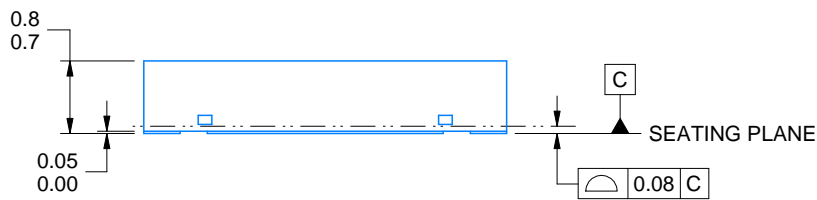
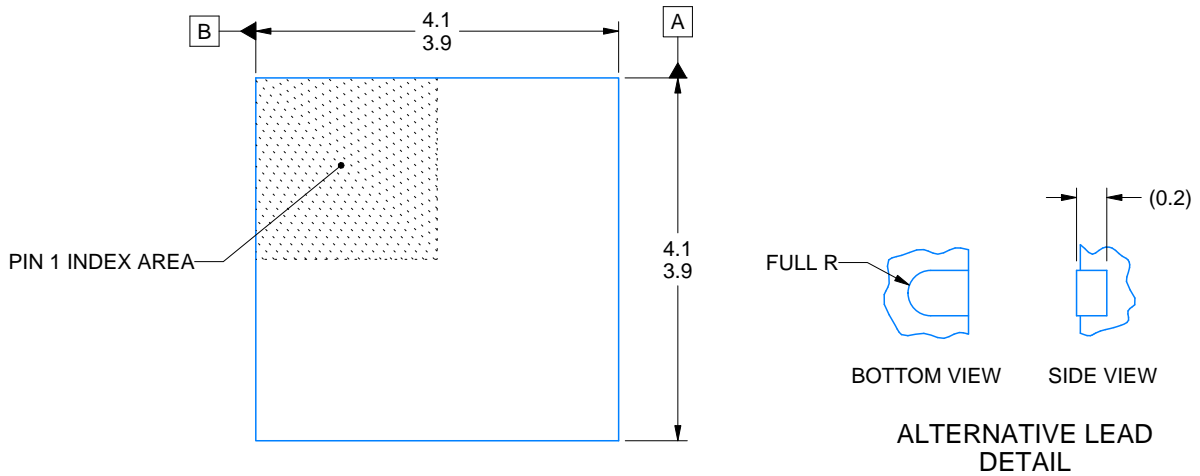
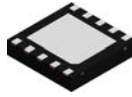
SOLDER PASTE EXAMPLE
BASED ON 0.125 MM THICK STENCIL
SCALE: 25X

EXPOSED PAD 10
82% PRINTED SOLDER COVERAGE BY AREA UNDER PACKAGE

4229027/A 09/2022

NOTES: (continued)

6. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.



4218856/B 01/2021

NOTES:

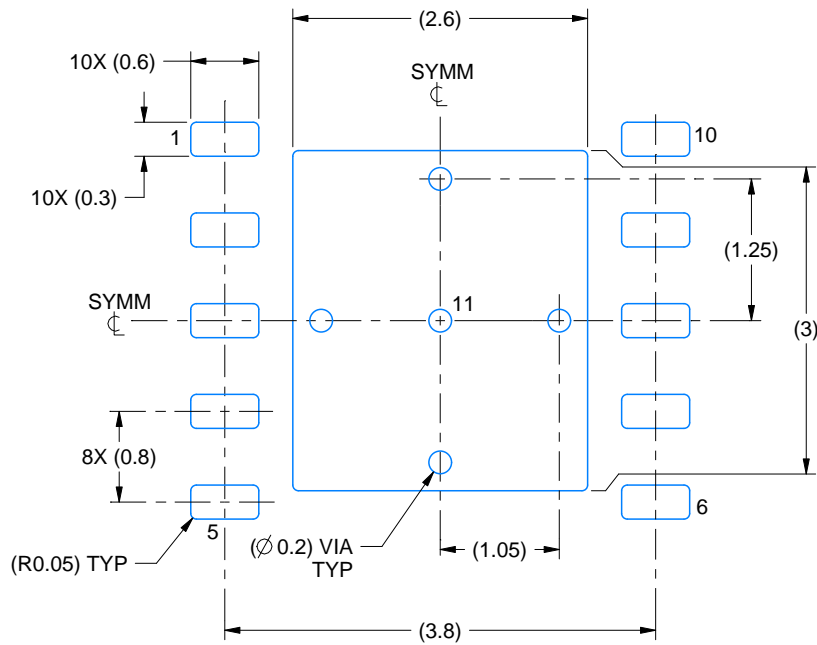
1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. The package thermal pad must be soldered to the printed circuit board for thermal and mechanical performance.

EXAMPLE BOARD LAYOUT

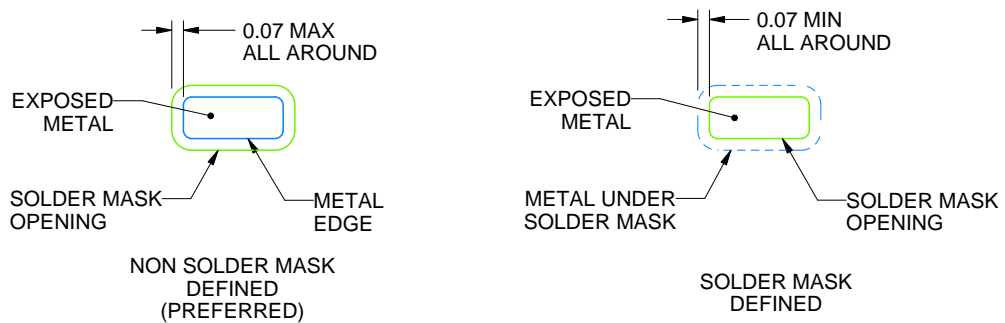
DPR0010A

WSON - 0.8 mm max height

PLASTIC SMALL OUTLINE - NO LEAD



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE:15X



SOLDER MASK DETAILS

4218856/B 01/2021

NOTES: (continued)

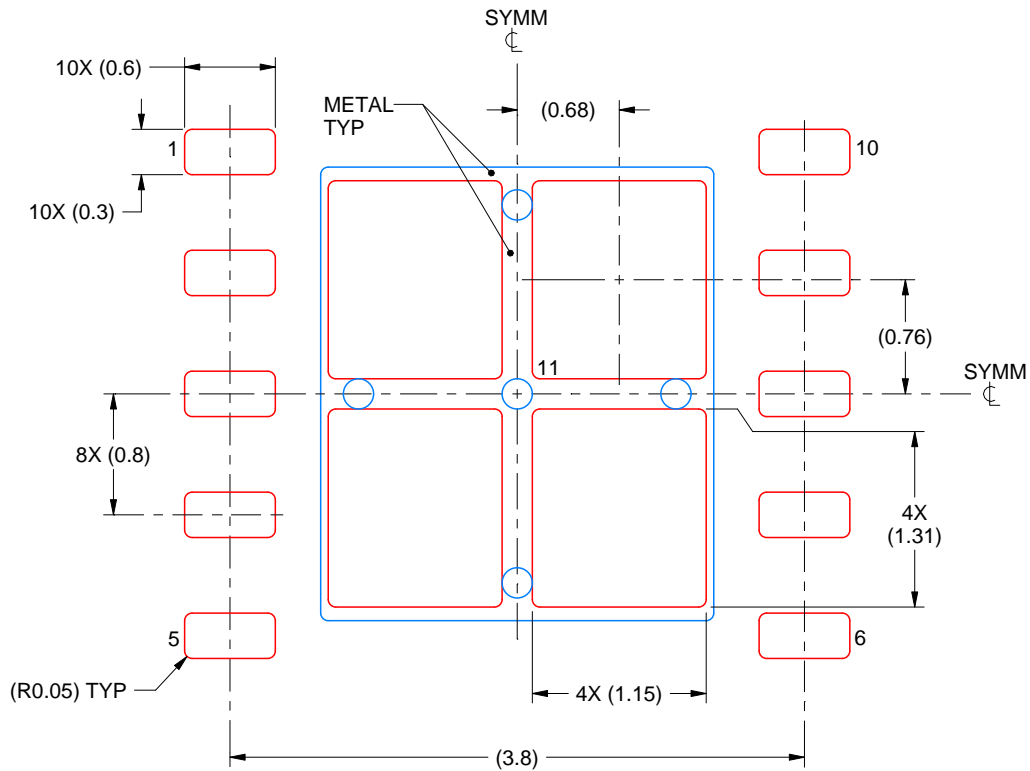
4. This package is designed to be soldered to a thermal pad on the board. For more information, see Texas Instruments literature number SLUA271 (www.ti.com/lit/slua271).

EXAMPLE STENCIL DESIGN

DPR0010A

WSN - 0.8 mm max height

PLASTIC SMALL OUTLINE - NO LEAD



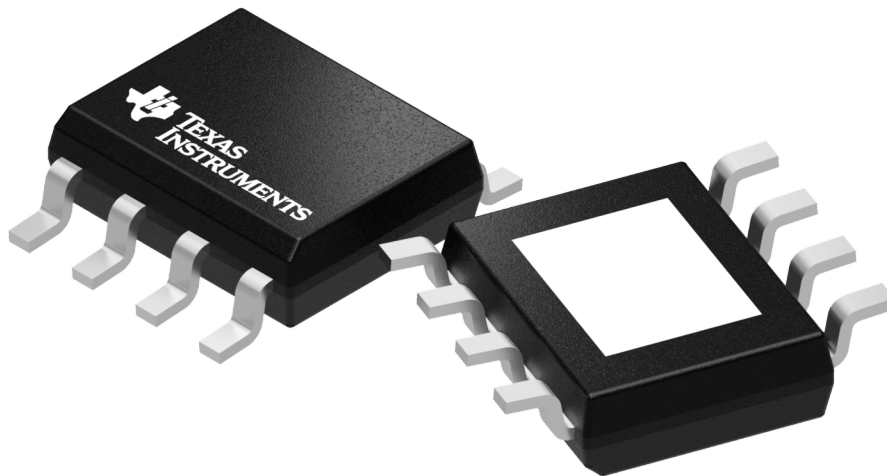
SOLDER PASTE EXAMPLE
BASED ON 0.125 mm THICK STENCIL

EXPOSED PAD 11:
77% PRINTED SOLDER COVERAGE BY AREA
SCALE:20X

4218856/B 01/2021

NOTES: (continued)

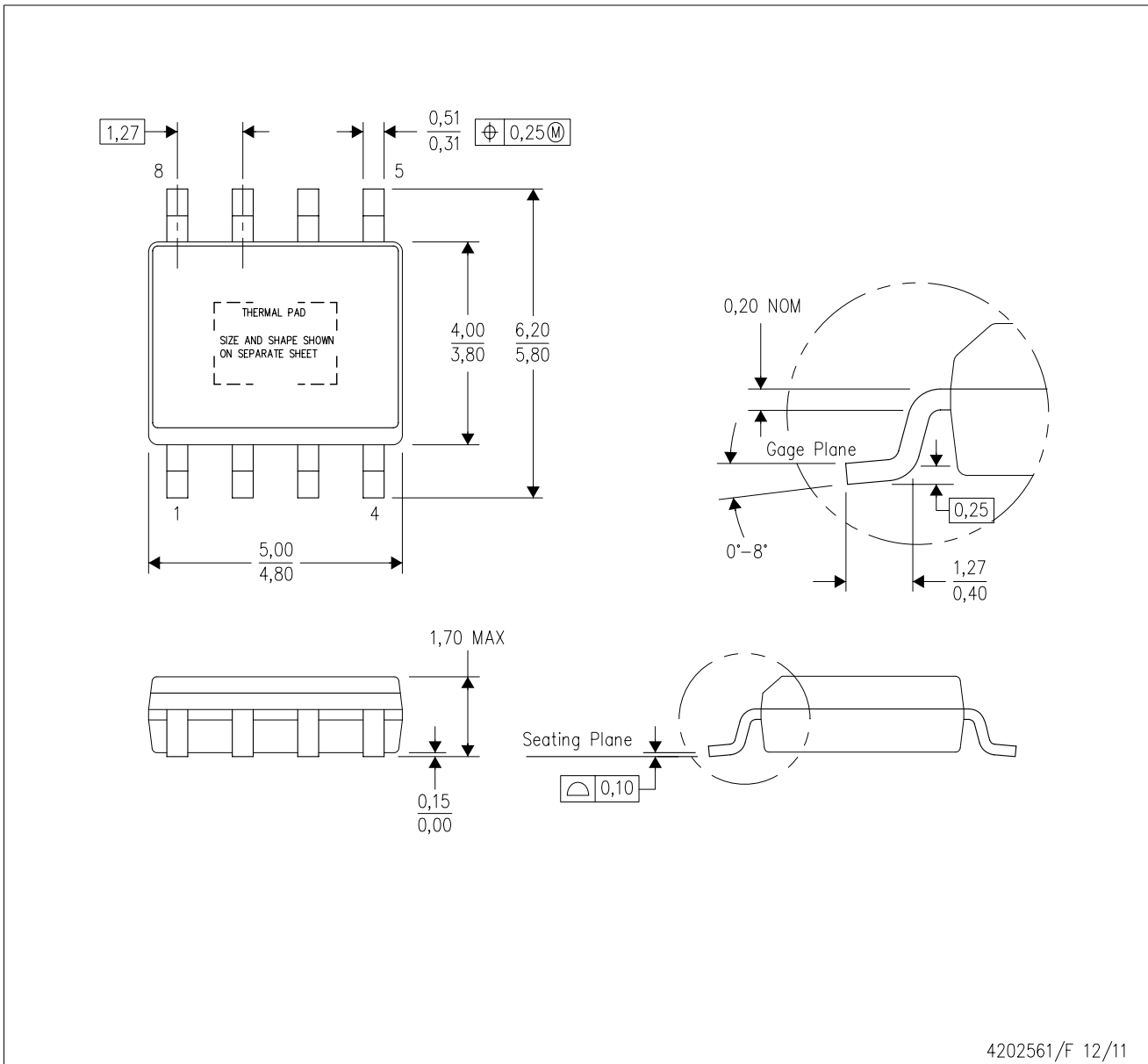
5. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.



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

DDA (R-PDSO-G8)

PowerPAD™ PLASTIC SMALL-OUTLINE



4202561/F 12/11

- NOTES:
- A. All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5-1994.
 - 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. This package is designed to be soldered to a thermal pad on the board. Refer to Technical Brief, PowerPad Thermally Enhanced Package, Texas Instruments Literature No. SLMA002 for information regarding recommended board layout. This document is available at www.ti.com <<http://www.ti.com>>.
 - E. See the additional figure in the Product Data Sheet for details regarding the exposed thermal pad features and dimensions.
 - F. This package complies to JEDEC MS-012 variation BA

PowerPAD is a trademark of Texas Instruments.

DDA (R-PDSO-G8)

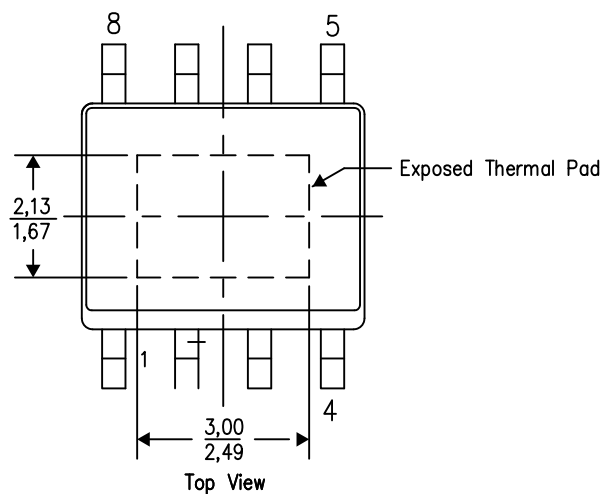
PowerPAD™ PLASTIC SMALL OUTLINE

THERMAL INFORMATION

This PowerPAD™ package incorporates an exposed thermal pad that is designed to be attached to a printed circuit board (PCB). The thermal pad must be soldered directly to the 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 additional information on the PowerPAD package and how to take advantage of its heat dissipating abilities, refer to Technical Brief, PowerPAD Thermally Enhanced Package, Texas Instruments Literature No. SLMA002 and Application Brief, PowerPAD Made Easy, Texas Instruments Literature No. SLMA004. Both documents are available at www.ti.com.

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

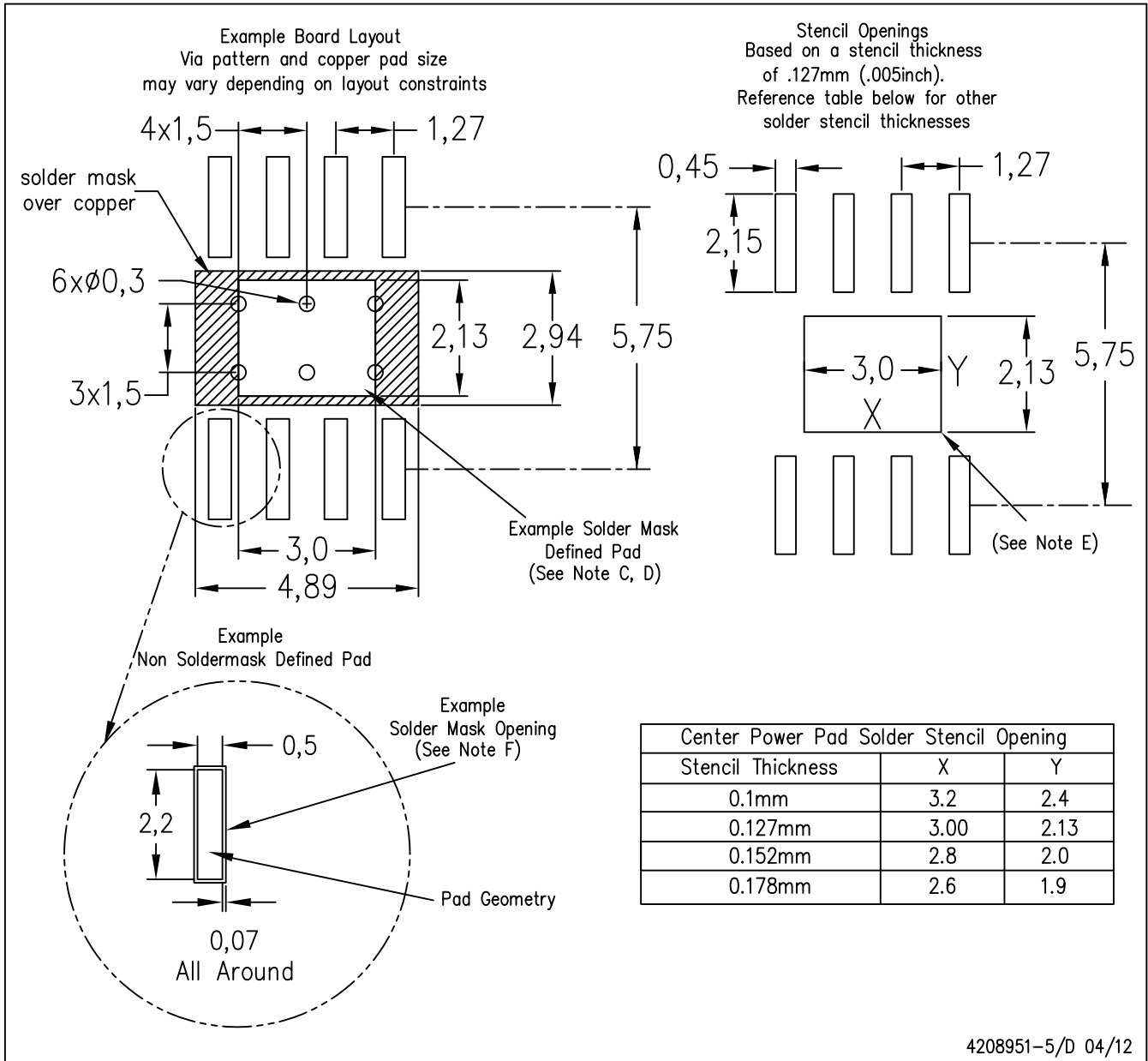


Exposed Thermal Pad Dimensions

4206322-5/L 05/12

NOTE: A. All linear dimensions are in millimeters

PowerPAD is a trademark of Texas Instruments

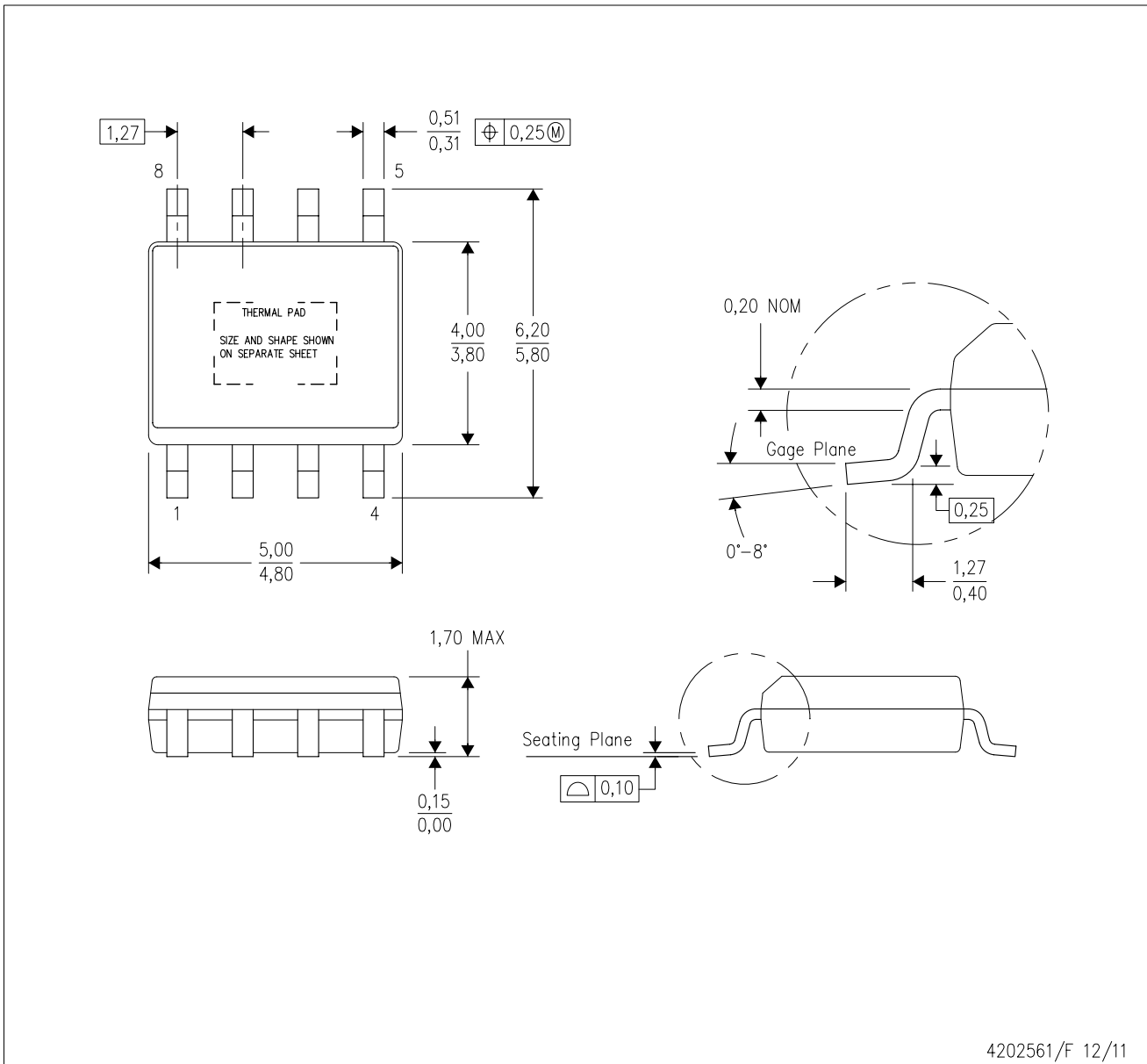


- NOTES:
- A. All linear dimensions are in millimeters.
 - B. This drawing is subject to change without notice.
 - C. Customers should place a note on the circuit board fabrication drawing not to alter the center solder mask defined pad.
 - D. This package is designed to be soldered to a thermal pad on the board. Refer to Technical Brief, PowerPad Thermally Enhanced Package, Texas Instruments Literature No. SLMA002, SLMA004, 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>>. Publication IPC-7351 is recommended for alternate designs.
 - 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. Example stencil design based on a 50% volumetric metal load solder paste. Refer to IPC-7525 for other stencil recommendations.
 - F. Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.

PowerPAD is a trademark of Texas Instruments.

DDA (R-PDSO-G8)

PowerPAD™ PLASTIC SMALL-OUTLINE



4202561/F 12/11

- NOTES:
- A. All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5-1994.
 - 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. This package is designed to be soldered to a thermal pad on the board. Refer to Technical Brief, PowerPad Thermally Enhanced Package, Texas Instruments Literature No. SLMA002 for information regarding recommended board layout. This document is available at www.ti.com <<http://www.ti.com>>.
 - E. See the additional figure in the Product Data Sheet for details regarding the exposed thermal pad features and dimensions.
 - F. This package complies to JEDEC MS-012 variation BA

PowerPAD is a trademark of Texas Instruments.

DDA (R-PDSO-G8)

PowerPAD™ PLASTIC SMALL OUTLINE

THERMAL INFORMATION

This PowerPAD™ package incorporates an exposed thermal pad that is designed to be attached to a printed circuit board (PCB). The thermal pad must be soldered directly to the 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 additional information on the PowerPAD package and how to take advantage of its heat dissipating abilities, refer to Technical Brief, PowerPAD Thermally Enhanced Package, Texas Instruments Literature No. SLMA002 and Application Brief, PowerPAD Made Easy, Texas Instruments Literature No. SLMA004. Both documents are available at www.ti.com.

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



Exposed Thermal Pad Dimensions

4206322-6/L 05/12

NOTE: A. All linear dimensions are in millimeters

PowerPAD is a trademark of Texas Instruments

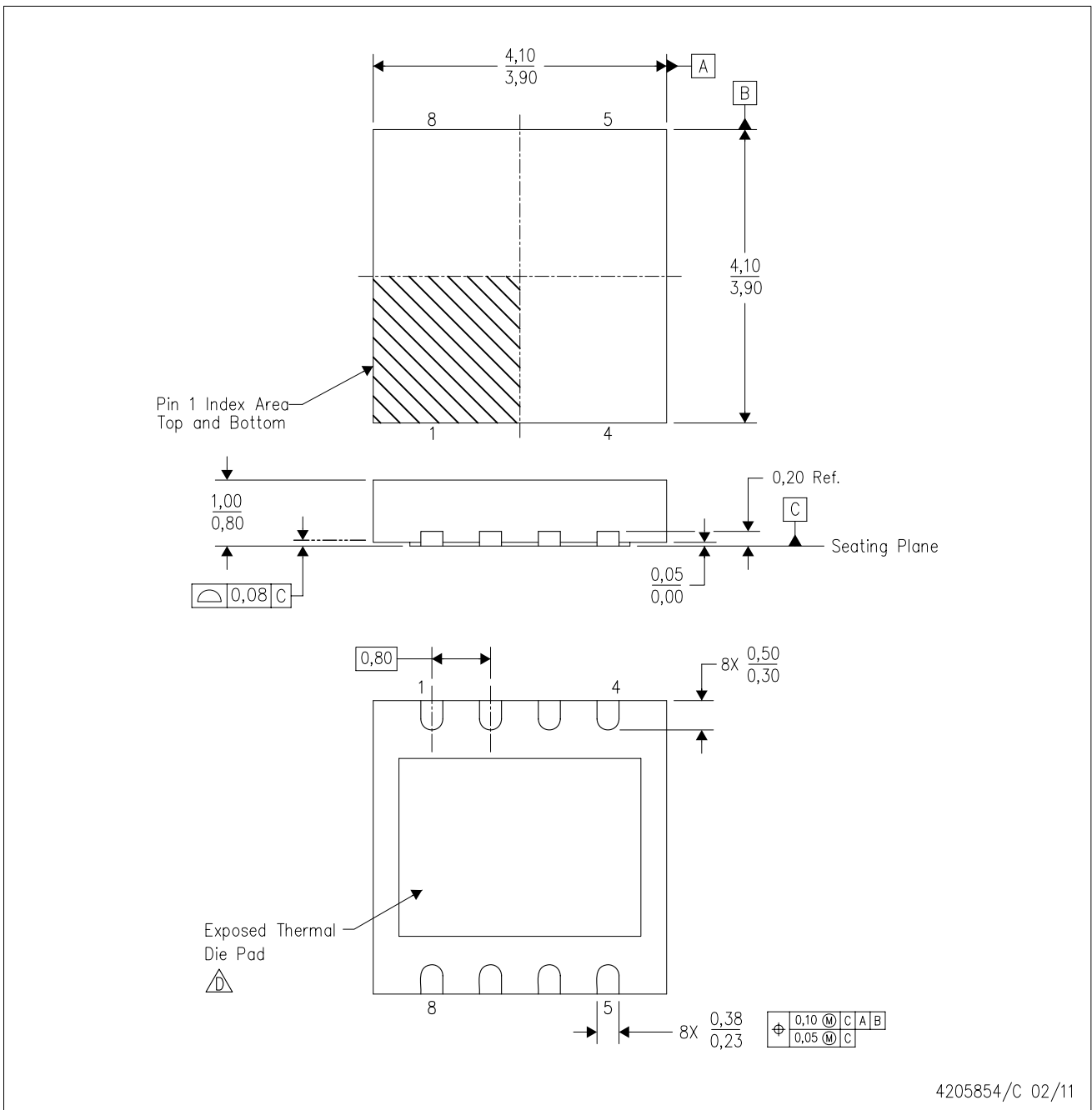


- NOTES:
- A. All linear dimensions are in millimeters.
 - B. This drawing is subject to change without notice.
 - C. Publication IPC-7351 is recommended for alternate designs.
 - D. This package is designed to be soldered to a thermal pad on the board. Refer to Technical Brief, PowerPad Thermally Enhanced Package, Texas Instruments Literature No. SLMA002, SLMA004, 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>>. Publication IPC-7351 is recommended for alternate designs.
 - 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. Example stencil design based on a 50% volumetric metal load solder paste. Refer to IPC-7525 for other stencil recommendations.
 - F. Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.

PowerPAD is a trademark of Texas Instruments.

DRM (S-PVSON-N8)

PLASTIC SMALL OUTLINE NO-LEAD



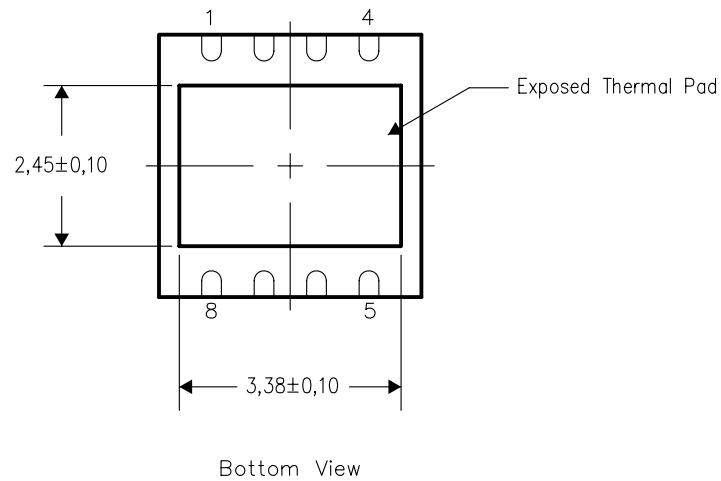
- NOTES:
- All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5M-1994.
 - This drawing is subject to change without notice.
 - SON (Small Outline No-Lead) package configuration.
- \triangle The package thermal pad must be soldered to the board for thermal and mechanical performance. See the Product Data Sheet for details regarding the exposed thermal pad dimensions.

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, Quad Flatpack No-Lead Logic Packages, Texas Instruments Literature No. SCBA017. This document is available at www.ti.com.

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



NOTE: All linear dimensions are in millimeters

Exposed Thermal Pad Dimensions



D0008A

PACKAGE OUTLINE

SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT



4214825/C 02/2019

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.

EXAMPLE BOARD LAYOUT

D0008A

SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT



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.

重要声明和免责声明

TI“按原样”提供技术和可靠性数据（包括数据表）、设计资源（包括参考设计）、应用或其他设计建议、网络工具、安全信息和其他资源，不保证没有瑕疵且不做任何明示或暗示的担保，包括但不限于对适销性、某特定用途方面的适用性或不侵犯任何第三方知识产权的暗示担保。

这些资源可供使用 TI 产品进行设计的熟练开发人员使用。您将自行承担以下全部责任：(1) 针对您的应用选择合适的 TI 产品，(2) 设计、验证并测试您的应用，(3) 确保您的应用满足相应标准以及任何其他功能安全、信息安全、监管或其他要求。

这些资源如有变更，恕不另行通知。TI 授权您仅可将这些资源用于研发本资源所述的 TI 产品的应用。严禁对这些资源进行其他复制或展示。您无权使用任何其他 TI 知识产权或任何第三方知识产权。您应全额赔偿因在这些资源的使用中对 TI 及其代表造成的任何索赔、损害、成本、损失和债务，TI 对此概不负责。

TI 提供的产品受 [TI 的销售条款](#) 或 [ti.com](#) 上其他适用条款/TI 产品随附的其他适用条款的约束。TI 提供这些资源并不会扩展或以其他方式更改 TI 针对 TI 产品发布的适用的担保或担保免责声明。

TI 反对并拒绝您可能提出的任何其他或不同的条款。

邮寄地址：Texas Instruments, Post Office Box 655303, Dallas, Texas 75265
Copyright © 2024，德州仪器 (TI) 公司