

SNx4AHC245 具有三态输出的八路总线收发器

1 特性

- 工作范围为 2V 至 5.5V V_{CC}
- 闩锁性能超过 250mA，符合 JESD 17 规范
- 对于符合 MIL-PRF-38535 标准的产品，所有参数均经过测试，除非另外注明。对于所有其他产品，生产流程不一定包含对所有参数的测试。

2 应用

- 服务器
- PC 和笔记本电脑
- 网络交换机
- 可穿戴保健和健身设备
- 电信基础设施
- 电子销售终端

3 说明

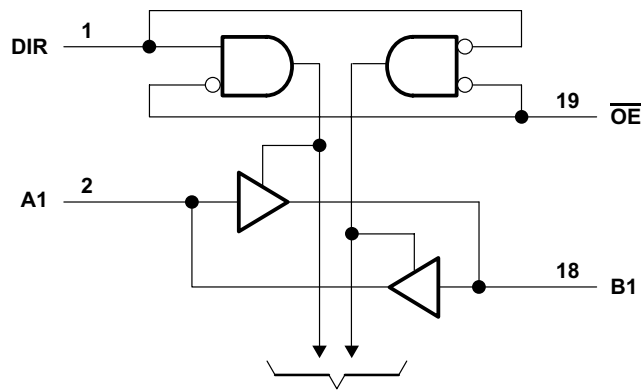
SNx4AHC245 八路总线收发器专为数据总线之间的异步双向通信而设计。此器件的工作电压范围为 4.5V 至 5.5V。

封装信息⁽¹⁾

| 器件型号 | 封装 | 封装尺寸 (标称值) |
|------------|-----------------------------------|------------------|
| SN54AHC245 | J (CDIP , 20) | 24.20mm × 6.92mm |
| | W (CFP , 20) | 13.09mm × 6.92mm |
| | FK (LCCC , 20) | 8.89mm × 8.89mm |
| SN74AHC245 | DB (SSOP , 20) | 7.20mm × 5.30mm |
| | DGV (TVSOP , 20) | 5.00mm × 4.40mm |
| | DW (SOIC , 20) | 12.80mm × 7.50mm |
| | N (PDIP , 20) | 24.33mm × 6.35mm |
| | PW (TSSOP , 20) | 6.50mm × 4.40mm |
| | DGS (VSSOP , 20) ⁽²⁾ | 5.10mm × 3.00mm |
| | RKS (VQFN , 20) ⁽²⁾ | 4.50mm × 2.50mm |

(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。

(2) 预发布封装



To Seven Other Channels

简化版原理图



Table of Contents

| | | | |
|---|----|--|----|
| 1 特性 | 1 | 8.2 Functional Block Diagram..... | 10 |
| 2 应用 | 1 | 8.3 Feature Description..... | 10 |
| 3 说明 | 1 | 8.4 Device Functional Modes..... | 10 |
| 4 Revision History | 2 | 9 Application and Implementation | 11 |
| 5 Pin Configuration and Functions | 3 | 9.1 Application Information..... | 11 |
| 6 Specifications | 5 | 9.2 Typical Application..... | 11 |
| 6.1 Absolute Maximum Ratings..... | 5 | 10 Power Supply Recommendations | 12 |
| 6.2 Handling Ratings..... | 5 | 11 Layout | 12 |
| 6.3 Recommended Operating Conditions..... | 5 | 11.1 Layout Guidelines..... | 12 |
| 6.4 Thermal Information..... | 6 | 11.2 Layout Example..... | 12 |
| 6.5 Electrical Characteristics..... | 6 | 12 Device and Documentation Support | 13 |
| 6.6 Switching Characteristics, $V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$ | 6 | 12.1 接收文档更新通知..... | 13 |
| 6.7 Switching Characteristics, $V_{CC} = 5\text{ V} \pm 0.5\text{ V}$ | 7 | 12.2 支持资源..... | 13 |
| 6.8 Noise Characteristics..... | 7 | 12.3 Trademarks..... | 13 |
| 6.9 Operating Characteristics..... | 8 | 12.4 Electrostatic Discharge Caution..... | 13 |
| 6.10 Typical Characteristics..... | 8 | 12.5 术语表..... | 13 |
| 7 Parameter Measurement Information | 9 | 13 Mechanical, Packaging, and Orderable Information | 13 |
| 8 Detailed Description | 10 | | |
| 8.1 Overview..... | 10 | | |

4 Revision History

注：以前版本的页码可能与当前版本的页码不同

| Changes from Revision J (July 2014) to Revision K (December 2022) | Page |
|---|-------------|
| • 更新了整个文档的表、图和交叉参考的编号格式..... | 1 |
| • 向数据表中添加了 <i>DGS</i> 和 <i>RKS</i> 封装..... | 1 |
| Changes from Revision I (July 2003) to Revision J (July 2014) | Page |
| • 将文档更新为新的 TI 数据表格式..... | 1 |
| • 删除了“订购信息”表..... | 1 |
| • 向“特性”列表中添加了“军用免责声明”。..... | 1 |
| • 添加了“应用”..... | 1 |
| • 添加了器件信息表..... | 1 |
| • Added Handling Ratings table..... | 5 |
| • Changed MAX ambient temperature to 125°C in Recommended Operating Conditions..... | 5 |
| • Added Typical Characteristics..... | 8 |
| • Added Application and Implementation section..... | 11 |
| • Added Power Supply Recommendations and Layout sections..... | 12 |

5 Pin Configuration and Functions

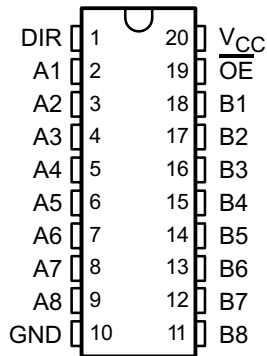


图 5-1. SN54AHC245 J or W, SN74AHC245 DB, DGV, DW, N, PW or DGS Package, CDIP, CFP, SSOP, TVSOP, SOIC, PDIP, TSSOP, or VSSOP 20-Pin (Top View)

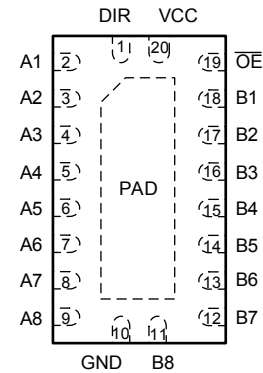


图 5-2. SN74AHC245 RKS Package, VQFN 20-Pin (Top View)

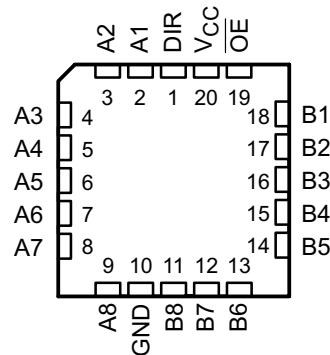


图 5-3. SN54AHC245 FK Package, LCCC 20-Pin (Top View)

表 5-1. Pin Functions

| PIN | | TYPE ⁽¹⁾ | DESCRIPTION |
|------|-----|---------------------|-----------------|
| NAME | NO. | | |
| DIR | 1 | I/O | Direction Pin |
| A1 | 2 | I/O | A1 Input/Output |
| A2 | 3 | I/O | Y4 Input/Output |
| A3 | 4 | I/O | A2 Input/Output |
| A4 | 5 | I/O | Y3 Input/Output |
| A5 | 6 | I/O | A3 Input/Output |
| A6 | 7 | I/O | Y2 Input/Output |
| A7 | 8 | I/O | A4 Input/Output |
| A8 | 9 | I/O | Y1 Input/Output |
| GND | 10 | — | Ground Pin |
| B8 | 11 | I/O | A1 Input/Output |
| B7 | 12 | I/O | Y4 Input/Output |
| B6 | 13 | I/O | A2 Input/Output |
| B5 | 14 | I/O | Y3 Input/Output |
| B4 | 15 | I/O | A3 Input/Output |
| B | 16 | I/O | Y2 Input/Output |
| B2 | 17 | I/O | A4 Input/Output |

表 5-1. Pin Functions (continued)

| PIN | | TYPE ⁽¹⁾ | DESCRIPTION |
|-----------------|-----|---------------------|----------------------------|
| NAME | NO. | | |
| B2 | 18 | I/O | Y1 Input/Output |
| B1 | 19 | I/O | Output Enable |
| V _{CC} | 20 | — | Power Pin |
| Thermal pad | | — | Thermal Pad ⁽²⁾ |

(1) I = Input, O = Output, I/O = Input or Output, G = Ground, P = Power

(2) RKS package only.

6 Specifications

6.1 Absolute Maximum Ratings

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

| | | | MIN | MAX | UNIT |
|---|------------------------------------|--|-------|-----------------------|------|
| V _{CC} | Supply voltage range | | - 0.5 | 7 | V |
| V _I | Input voltage range ⁽¹⁾ | Control inputs | - 0.5 | 7 | V |
| V _O | I/O, Output voltage range | | - 0.5 | V _{CC} + 0.5 | V |
| I _{IK} | Input clamp current | V _I < 0 | | - 20 | mA |
| I _{OK} | I/O, Output clamp current | V _O < 0 or V _O > V _{CC} | | ±20 | mA |
| I _O | Continuous output current | V _O = 0 to V _{CC} | | ±25 | mA |
| Continuous current through V _{CC} or GND | | | | ±75 | mA |

(1) The input and output negative-voltage ratings may be exceeded if the input and output current ratings are observed.

6.2 Handling Ratings

| | | MIN | MAX | UNIT | |
|--------------------|---------------------------|--|-----|------|---|
| T _{stg} | Storage temperature range | - 65 | 150 | °C | |
| V _(ESD) | Electrostatic discharge | Human body model (HBM), per ANSI/ESDA/JEDEC JS-001, all pins ⁽¹⁾ | 0 | 1500 | V |
| | | Charged device model (CDM), per JEDEC specification JESD22-C101, all pins ⁽²⁾ | 0 | 2000 | |

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

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

6.3 Recommended Operating Conditions

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

| | | SN54AHC245 | | SN74AHC245 | | UNIT |
|-----------------|------------------------------------|---------------------------------|-----------------|------------|-----------------|------|
| | | MIN | MAX | MIN | MAX | |
| V _{CC} | Supply voltage | 2 | 5.5 | 2 | 5.5 | V |
| V _{IH} | High-level input voltage | V _{CC} = 2 V | 1.5 | 1.5 | | V |
| | | V _{CC} = 3 V | 2.1 | 2.1 | | |
| | | V _{CC} = 5.5 V | 3.85 | 3.85 | | |
| V _{IL} | Low-level input voltage | V _{CC} = 2 V | | 0.5 | 0.5 | V |
| | | V _{CC} = 3 V | | 0.9 | 0.9 | |
| | | V _{CC} = 5.5 V | | 1.65 | 1.65 | |
| V _I | Input voltage | 0 | 5.5 | 0 | 5.5 | V |
| V _O | Output voltage | 0 | V _{CC} | 0 | V _{CC} | V |
| I _{OH} | High-level output current | V _{CC} = 2 V | | - 50 | - 50 | μA |
| | | V _{CC} = 3.3 V ± 0.3 V | | - 4 | - 4 | mA |
| | | V _{CC} = 5 V ± 0.5 V | | - 8 | - 8 | |
| I _{OL} | Low-level output current | V _{CC} = 2 V | | 50 | 50 | μA |
| | | V _{CC} = 3.3 V ± 0.3 V | | 4 | 4 | mA |
| | | V _{CC} = 5 V ± 0.5 V | | 8 | 8 | |
| Δt/Δv | Input transition rise or fall rate | V _{CC} = 3.3 V ± 0.3 V | | 100 | 100 | ns/V |
| | | V _{CC} = 5 V ± 0.5 V | | 20 | 20 | |
| T _A | Operating free-air temperature | - 55 | 125 | - 40 | 125 | °C |

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

6.4 Thermal Information

| THERMAL METRIC ⁽¹⁾ | DB | DGV | DW | N | NS | PW | RGY | RKS | DGS | UNIT |
|--|---------|-------|------|------|------|-------|------|------|-------|------|
| | 20 PINS | | | | | | | | | |
| R _{θJA} Junction-to-ambient thermal resistance | 96.0 | 116.1 | 79.8 | 51.5 | 77.1 | 102.8 | 35.1 | 67.7 | 118.4 | °C/W |
| R _{θJC(top)} Junction-to-case (top) thermal resistance | 57.7 | 31.3 | 45.8 | 38.2 | 43.6 | 36.8 | 43.3 | 72.4 | 57.7 | |
| R _{θJB} Junction-to-board thermal resistance | 51.2 | 57.6 | 47.4 | 32.4 | 44.6 | 53.8 | 12.9 | 40.4 | 73.1 | |
| ψ _{JT} Junction-to-top characterization parameter | 19.4 | 1.0 | 18.5 | 24.6 | 17.2 | 2.5 | 0.9 | 10.3 | 5.7 | |
| ψ _{JB} Junction-to-board characterization parameter | 50.8 | 56.9 | 47.0 | 32.3 | 44.2 | 53.3 | 12.9 | 40.4 | 72.7 | |
| R _{θJC(bot)} Junction-to-case (bottom) thermal resistance | n/a | n/a | n/a | n/a | n/a | n/a | 7.9 | 24.1 | n/a | |

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

6.5 Electrical Characteristics

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

| PARAMETER | TEST CONDITIONS | V _{CC} | T _A = 25°C | | | SN54AHC245 | | SN74AHC245 | | UNIT |
|--------------------------------|---------------------------|---|-----------------------|-----|------|------------|-----|-------------------|------|------|
| | | | MIN | TYP | MAX | MIN | MAX | MIN | MAX | |
| V _{OH} | I _{OH} = - 50 μA | 2 V | 1.9 | 2 | | 1.9 | | 1.9 | V | |
| | | 3 V | 2.9 | 3 | | 2.9 | | 2.9 | | |
| | | 4.5 V | 4.4 | 4.5 | | 4.4 | | 4.4 | | |
| | I _{OH} = - 4 mA | 3 V | 2.58 | | | 2.48 | | 2.48 | | |
| | I _{OH} = - 8 mA | 4.5 V | 3.94 | | | 3.8 | | 3.8 | | |
| V _{OL} | I _{OL} = 50 μA | 2 V | | | 0.1 | | 0.1 | 0.1 | V | |
| | | 3 V | | | 0.1 | | 0.1 | 0.1 | | |
| | | 4.5 V | | | 0.1 | | 0.1 | 0.1 | | |
| | I _{OL} = 4 mA | 3 V | | | 0.36 | | 0.5 | 0.44 | | |
| | I _{OL} = 8 mA | 4.5 V | | | 0.36 | | 0.5 | 0.44 | | |
| I _I | A or B inputs | V _I = V _{CC} or GND | 5.5 V | | | ±0.1 | | ±1 | ±1 | μA |
| | OE or DIR | 0 V to 5.5 V | | | | ±0.1 | | ±1 ⁽¹⁾ | ±1 | |
| I _{OZ} ⁽²⁾ | | V _O = V _{CC} or GND, V _I (OE) = V _{IL} or V _{IH} | 5.5 V | | | ±0.25 | | ±2.5 | ±2.5 | μA |
| I _{CC} | | V _I = V _{CC} or GND, I _O = 0 | 5.5 V | | | 4 | | 40 | 40 | μA |
| C _i | OE or DIR | V _I = V _{CC} or GND | 5 V | | | 2.5 | | 10 | 10 | pF |
| C _{io} | A or B inputs | V _I = V _{CC} or GND | 5 V | | | 4 | | | | pF |

(1) On products compliant to MIL-PRF-38535, this parameter is not production tested at V_{CC} = 0 V.

(2) The parameter I_{OZ} includes the input leakage current.

6.6 Switching Characteristics, V_{CC} = 3.3 V ± 0.3 V

over recommended operating free-air temperature range (unless otherwise noted) (see 图 7-1)

| PARAMETER | FROM (INPUT) | TO (OUTPUT) | LOAD CAPACITANCE | T _A = 25°C | | | SN54AHC245 | | SN74AHC245 | | UNIT |
|------------------|--------------|-------------|------------------------|-----------------------|--------------------|---------------------|------------------|---------------------|------------|------|------|
| | | | | MIN | TYP | MAX | MIN | MAX | MIN | MAX | |
| t _{PLH} | A or B | B or A | C _L = 15 pF | | 5.8 ⁽¹⁾ | 8.4 ⁽¹⁾ | 1 ⁽¹⁾ | 10 ⁽¹⁾ | 1 | 10 | ns |
| t _{PHL} | | | | | 5.8 ⁽¹⁾ | 8.4 ⁽¹⁾ | 1 ⁽¹⁾ | 10 ⁽¹⁾ | 1 | 10 | |
| t _{PZH} | OE | A or B | C _L = 15 pF | | 8.5 ⁽¹⁾ | 13.2 ⁽¹⁾ | 1 ⁽¹⁾ | 15.5 ⁽¹⁾ | 1 | 15.5 | ns |
| t _{PZL} | | | | | 8.5 ⁽¹⁾ | 13.2 ⁽¹⁾ | 1 ⁽¹⁾ | 15.5 ⁽¹⁾ | 1 | 15.5 | |
| t _{PHZ} | OE | A or B | C _L = 15 pF | | 8.9 ⁽¹⁾ | 12.5 ⁽¹⁾ | 1 ⁽¹⁾ | 15.5 ⁽¹⁾ | 1 | 15.5 | ns |
| t _{PLZ} | | | | | 8.9 ⁽¹⁾ | 12.5 ⁽¹⁾ | 1 ⁽¹⁾ | 15.5 ⁽¹⁾ | 1 | 15.5 | |

6.6 Switching Characteristics, $V_{CC} = 3.3 V \pm 0.3 V$ (continued)

over recommended operating free-air temperature range (unless otherwise noted) (see [图 7-1](#))

| PARAMETER | FROM (INPUT) | TO (OUTPUT) | LOAD CAPACITANCE | $T_A = 25^\circ C$ | | | SN54AHC245 | | SN74AHC245 | | UNIT |
|-------------|-----------------|-------------|-----------------------|--------------------|--------------------|-----|------------|-----|------------|-----|------|
| | | | | MIN | TYP | MAX | MIN | MAX | MIN | MAX | |
| t_{PLH} | A or B | B or A | $C_L = 50 \text{ pF}$ | 8.3 | 11.9 | 1 | 13.5 | 1 | 13.5 | ns | |
| t_{PHL} | | | | 8.3 | 11.9 | 1 | 13.5 | 1 | 13.5 | | |
| t_{PZH} | \overline{OE} | A or B | $C_L = 50 \text{ pF}$ | 11 | 16.7 | 1 | 19 | 1 | 19 | ns | |
| t_{PZL} | | | | 11 | 16.7 | 1 | 19 | 1 | 19 | | |
| t_{PHZ} | \overline{OE} | A or B | $C_L = 50 \text{ pF}$ | 11.5 | 15.8 | 1 | 18 | 1 | 18 | ns | |
| t_{PLZ} | | | | 11.5 | 15.8 | 1 | 18 | 1 | 18 | | |
| $t_{sk(o)}$ | | | $C_L = 50 \text{ pF}$ | | 1.5 ⁽²⁾ | | | | 1.5 | ns | |

- (1) On products compliant to MIL-PRF-38535, this parameter is not production tested.
(2) On products compliant to MIL-PRF-38535, this parameter does not apply.

6.7 Switching Characteristics, $V_{CC} = 5 V \pm 0.5 V$

over recommended operating free-air temperature range (unless otherwise noted) (see [图 7-1](#))

| PARAMETER | FROM (INPUT) | TO (OUTPUT) | LOAD CAPACITANCE | $T_A = 25^\circ C$ | | | SN54AHC245 | | SN74AHC245 | | UNIT |
|-------------|-----------------|-------------|-----------------------|--------------------|--------------------|------------------|--------------------|-----|------------|-----|------|
| | | | | MIN | TYP | MAX | MIN | MAX | MIN | MAX | |
| t_{PLH} | A or B | B or A | $C_L = 15 \text{ pF}$ | 4 ⁽¹⁾ | 5.5 ⁽¹⁾ | 1 ⁽¹⁾ | 6.5 ⁽¹⁾ | 1 | 6.5 | ns | |
| t_{PHL} | | | | 4 ⁽¹⁾ | 5.5 ⁽¹⁾ | 1 ⁽¹⁾ | 6.5 ⁽¹⁾ | 1 | 6.5 | | |
| t_{PZH} | \overline{OE} | A or B | $C_L = 15 \text{ pF}$ | 5.8 ⁽¹⁾ | 8.5 ⁽¹⁾ | 1 ⁽¹⁾ | 10 ⁽¹⁾ | 1 | 10 | ns | |
| t_{PZL} | | | | 5.8 ⁽¹⁾ | 8.5 ⁽¹⁾ | 1 ⁽¹⁾ | 10 ⁽¹⁾ | 1 | 10 | | |
| t_{PHZ} | \overline{OE} | A or B | $C_L = 15 \text{ pF}$ | 5.6 ⁽¹⁾ | 7.8 ⁽¹⁾ | 1 ⁽¹⁾ | 9.2 ⁽¹⁾ | 1 | 9.2 | ns | |
| t_{PLZ} | | | | 5.6 ⁽¹⁾ | 7.8 ⁽¹⁾ | 1 ⁽¹⁾ | 9.2 ⁽¹⁾ | 1 | 9.2 | | |
| t_{PLH} | A or B | B or A | $C_L = 50 \text{ pF}$ | 5.5 | 7.5 | 1 | 8.5 | 1 | 8.5 | ns | |
| t_{PHL} | | | | 5.5 | 7.5 | 1 | 8.5 | 1 | 8.5 | | |
| t_{PZH} | \overline{OE} | A or B | $C_L = 50 \text{ pF}$ | 7.3 | 10.6 | 1 | 12 | 1 | 12 | ns | |
| t_{PZL} | | | | 7.3 | 10.6 | 1 | 12 | 1 | 12 | | |
| t_{PHZ} | \overline{OE} | A or B | $C_L = 50 \text{ pF}$ | 7 | 9.7 | 1 | 11 | 1 | 11 | ns | |
| t_{PLZ} | | | | 7 | 9.7 | 1 | 11 | 1 | 11 | | |
| $t_{sk(o)}$ | | | $C_L = 50 \text{ pF}$ | | 1 ⁽²⁾ | | | | 1 | ns | |

- (1) On products compliant to MIL-PRF-38535, this parameter is not production tested.
(2) On products compliant to MIL-PRF-38535, this parameter does not apply.

6.8 Noise Characteristics

$V_{CC} = 5 V$, $C_L = 50 \text{ pF}$, $T_A = 25^\circ C$ ⁽¹⁾

| PARAMETER | | MIN | TYP | MAX | UNIT |
|-------------|--|-----|------|-----|------|
| $V_{OL(P)}$ | Quiet output, maximum dynamic V_{OL} | | 0.9 | | V |
| $V_{OL(V)}$ | Quiet output, minimum dynamic V_{OL} | | -0.9 | | V |
| $V_{OH(V)}$ | Quiet output, minimum dynamic V_{OH} | | 4.3 | | V |
| $V_{IH(D)}$ | High-level dynamic input voltage | 3.5 | | | V |
| $V_{IL(D)}$ | Low-level dynamic input voltage | | | 1.5 | V |

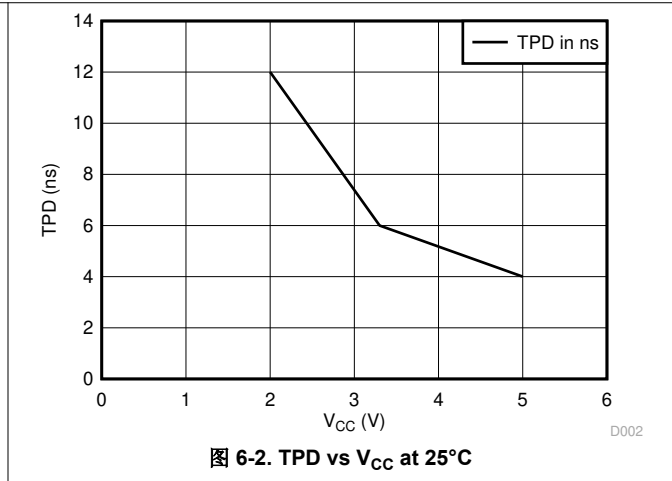
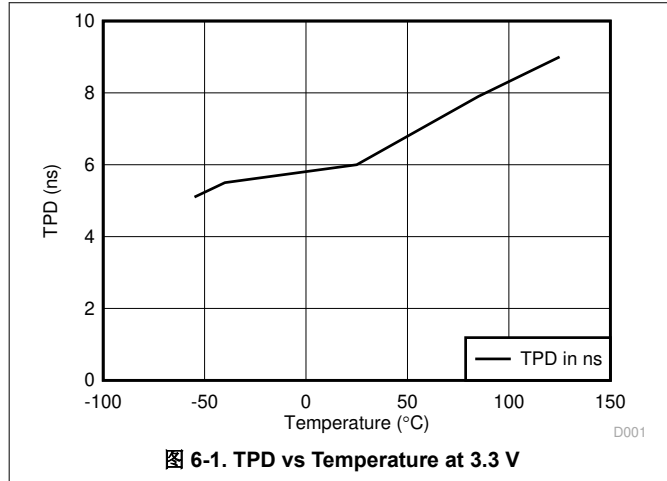
- (1) Characteristics are for surface-mount packages only.

6.9 Operating Characteristics

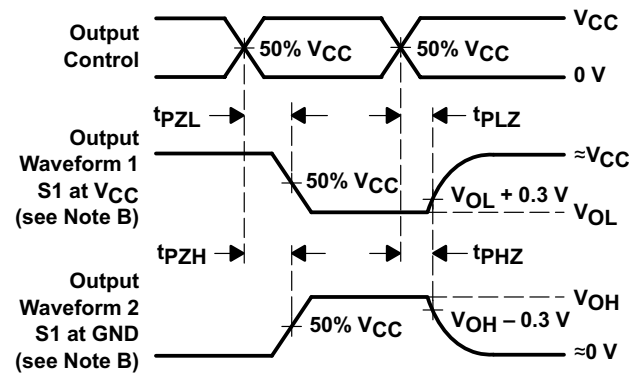
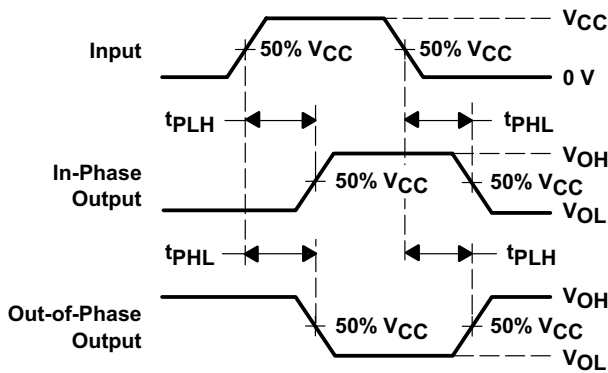
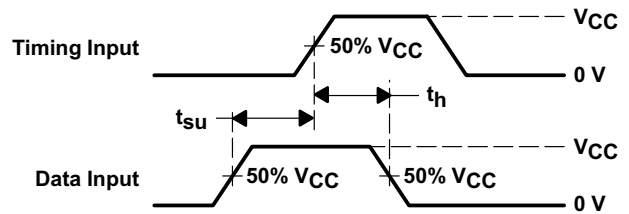
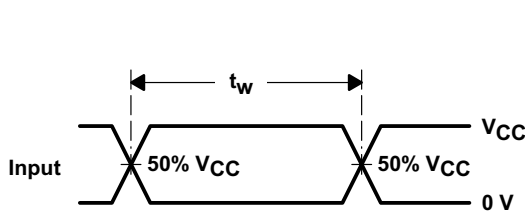
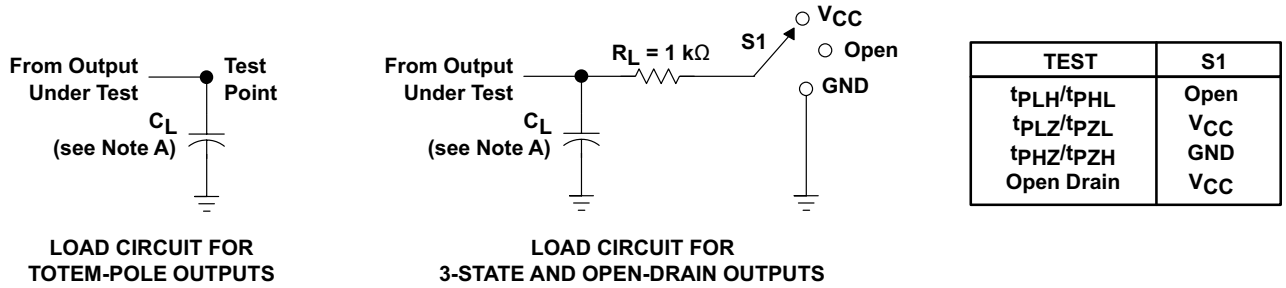
$V_{CC} = 5\text{ V}$, $T_A = 25^\circ\text{C}$

| PARAMETER | TEST CONDITIONS | TYP | UNIT |
|--|----------------------------|-----|------|
| C_{pd} Power dissipation capacitance | No load $f = 1\text{ MHz}$ | 14 | pF |

6.10 Typical Characteristics



7 Parameter Measurement Information



- NOTES: A. C_L includes probe and jig capacitance.
 B. Waveform 1 is for an output with internal conditions such that the output is low except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high except when disabled by the output control.
 C. All input pulses are supplied by generators having the following characteristics: $PRR \leq 1$ MHz, $Z_O = 50 \Omega$, $t_r \leq 3$ ns, $t_f \leq 3$ ns.
 D. The outputs are measured one at a time with one input transition per measurement.
 E. All parameters and waveforms are not applicable to all devices.

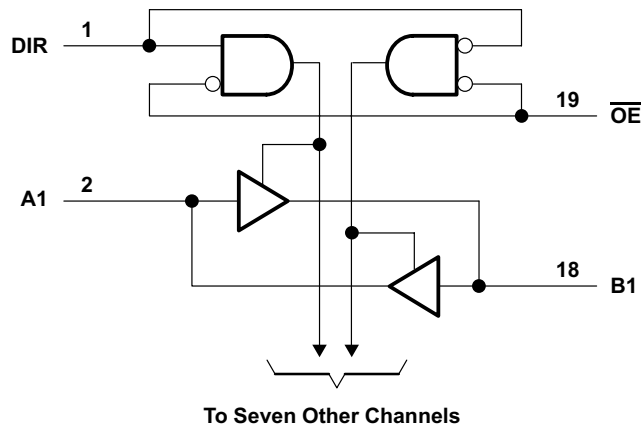
图 7-1. Load Circuit and Voltage Waveforms

8 Detailed Description

8.1 Overview

These octal bus transceivers are designed for asynchronous two-way communication between data buses. The control-function implementation minimizes external timing requirements. The SNx4AHC245 devices allow data transmission from the A bus to the B bus or from the B bus to the A bus, depending on the logic level at the direction-control (DIR) input. The output-enable (\overline{OE}) input can be used to disable the device so that the buses are effectively isolated. To ensure the high-impedance state during power up or power down, \overline{OE} should be tied to V_{CC} through a pullup resistor; the minimum value of the resistor is determined by the current-sinking capability of the driver.

8.2 Functional Block Diagram



8.3 Feature Description

- V_{CC} is optimized at 5 V
- Allows down voltage translation from 5 V to 3.3 V
 - Inputs accept voltage levels up to 5.5 V
- Slow edge rates minimize output ringing

8.4 Device Functional Modes

表 8-1. Function Table
(Each Transceiver)

| INPUTS | | OPERATION |
|-----------------|-----|-----------------|
| \overline{OE} | DIR | |
| L | L | B data to A bus |
| L | H | A data to B bus |
| H | X | Isolation |

9 Application and Implementation

备注

以下应用部分中的信息不属于 TI 器件规格的范围，TI 不担保其准确性和完整性。TI 的客户应负责确定器件是否适用于其应用。客户应验证并测试其设计，以确保系统功能。

9.1 Application Information

The SNx4AHC245A is a low-drive CMOS device that can be used for a multitude of bus interface type applications where output ringing is a concern. The low drive and slow edge rates will minimize overshoot and undershoot on the outputs. The inputs can accept voltages to 5.5 V at any valid V_{CC} making it ideal for down translation.

9.2 Typical Application

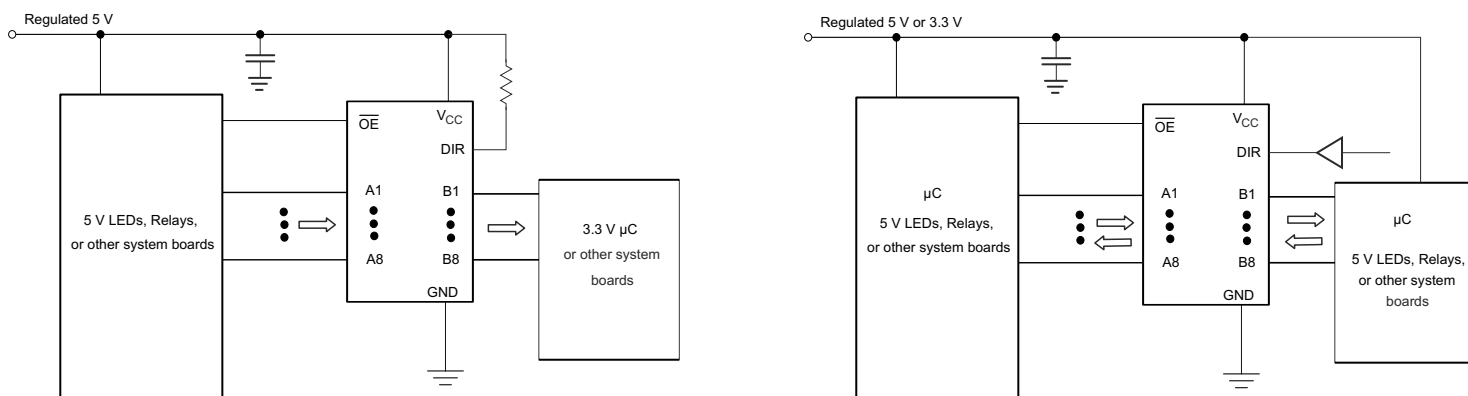


图 9-1. Typical Application Schematic

9.2.1 Design Requirements

This device uses CMOS technology and has balanced output drive. Care should be taken to avoid bus contention because it can drive currents that would exceed maximum limits. Outputs can be combined to produce higher drive but the high drive will also create faster edges into light loads, so routing and load conditions should be considered to prevent ringing.

9.2.2 Detailed Design Procedure

1. Recommended Input Conditions
 - Rise time and fall time specs: See ($\Delta t / \Delta V$) in the [§ 6.3](#) table.
 - Specified high and low levels: See (V_{IH} and V_{IL}) in the [§ 6.3](#) table.
 - Inputs are overvoltage tolerant allowing them to go as high as 5.5 V at any valid V_{CC} .
2. Recommend Output Conditions
 - Load currents should not exceed 25 mA per output and 75 mA total for the part.
 - Outputs should not be pulled above V_{CC} .

9.2.3 Application Curves

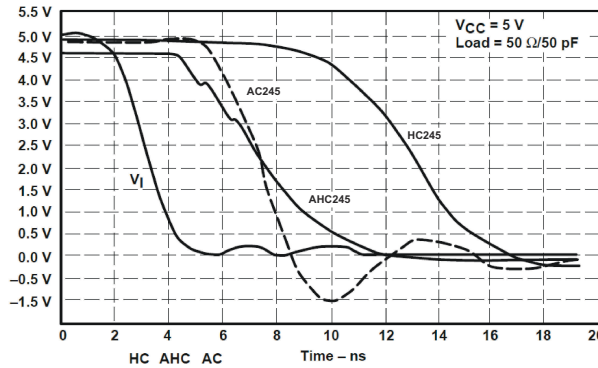


图 9-2. Switching Characteristics Comparison

10 Power Supply Recommendations

The power supply can be any voltage between the MIN and MAX supply voltage rating located in the [# 6.3](#) table.

Each V_{CC} pin should have a good bypass capacitor to prevent power disturbance. For devices with a single supply, 0.1 μF is recommended; if there are multiple V_{CC} pins, then 0.01 μF or 0.022 μF is recommended for each power pin. It is acceptable to parallel multiple bypass caps to reject different frequencies of noise. A 0.1 μF and a 1 μF are commonly used in parallel. The bypass capacitor should be installed as close to the power pin as possible for best results.

11 Layout

11.1 Layout Guidelines

When using multiple-bit logic devices, inputs should never float.

In many cases, functions or parts of functions of digital logic devices are unused, for example, when only two inputs of a triple-input AND gate are used or only 3 of the 4 buffer gates are used. Such input pins should not be left unconnected because the undefined voltages at the outside connections result in undefined operational states. [图 11-1](#) specifies the rules that must be observed under all circumstances. All unused inputs of digital logic devices must be connected to a high or low bias to prevent them from floating. The logic level that should be applied to any particular unused input depends on the function of the device. Generally they will be tied to GND or V_{CC} , whichever makes more sense or is more convenient. It is generally acceptable to float outputs, unless the part is a transceiver. If the transceiver has an output enable pin, it will disable the output section of the part when asserted. This will not disable the input section of the IOs, so they cannot float when disabled.

11.2 Layout Example

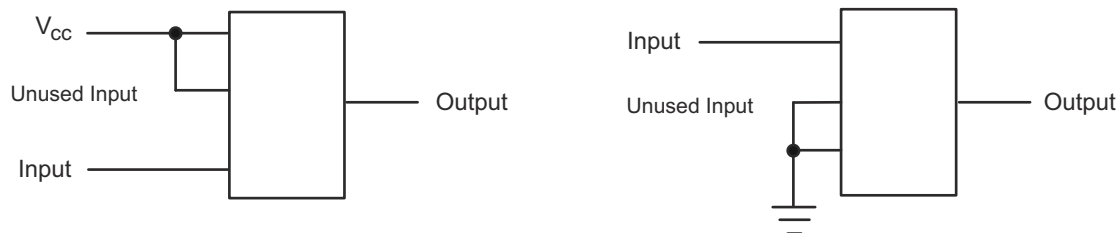


图 11-1. Layout Diagram

12 Device and Documentation Support

12.1 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。

12.2 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](#)》。

12.3 Trademarks

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

12.4 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.

12.5 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。

13 Mechanical, Packaging, and Orderable Information

The following pages include mechanical, packaging, and orderable information. This information is the most current data available for the designated devices. This data is subject to change without notice and revision of this document. For browser-based versions of this data sheet, refer to the left-hand navigation.

PACKAGING INFORMATION

| Orderable Device | Status (1) | Package Type | Package Drawing | Pins | Package Qty | Eco Plan (2) | Lead finish/ Ball material (6) | MSL Peak Temp (3) | Op Temp (°C) | Device Marking (4/5) | Samples |
|------------------|---------------|--------------|-----------------|------|-------------|------------------|--------------------------------------|----------------------|--------------|-------------------------------------|-------------------------|
| 5962-9681801Q2A | ACTIVE | LCCC | FK | 20 | 1 | Non-RoHS & Green | SNPB | N / A for Pkg Type | -55 to 125 | 5962-9681801Q2A SNJ54AHC245FK | Samples |
| 5962-9681801QRA | ACTIVE | CDIP | J | 20 | 1 | Non-RoHS & Green | SNPB | N / A for Pkg Type | -55 to 125 | 5962-9681801QR A SNJ54AHC245J | Samples |
| 5962-9681801QSA | ACTIVE | CFP | W | 20 | 1 | Non-RoHS & Green | SNPB | N / A for Pkg Type | -55 to 125 | 5962-9681801QS A SNJ54AHC245W | Samples |
| 5962-9681801VSA | ACTIVE | CFP | W | 20 | 25 | Non-RoHS & Green | SNPB | N / A for Pkg Type | -55 to 125 | 5962-9681801VS A SNV54AHC245W | Samples |
| PSN74AHC245RKSR | ACTIVE | VQFN | RKS | 20 | 3000 | TBD | Call TI | Call TI | -40 to 125 | | Samples |
| SN74AHC245DBR | ACTIVE | SSOP | DB | 20 | 2000 | RoHS & Green | NIPDAU | Level-1-260C-UNLIM | -40 to 125 | HA245 | Samples |
| SN74AHC245DGVR | ACTIVE | TVSOP | DGV | 20 | 2000 | RoHS & Green | NIPDAU | Level-1-260C-UNLIM | -40 to 125 | HA245 | Samples |
| SN74AHC245DW | ACTIVE | SOIC | DW | 20 | 25 | RoHS & Green | NIPDAU | Level-1-260C-UNLIM | -40 to 125 | AHC245 | Samples |
| SN74AHC245DWR | ACTIVE | SOIC | DW | 20 | 2000 | RoHS & Green | NIPDAU | Level-1-260C-UNLIM | -40 to 125 | AHC245 | Samples |
| SN74AHC245DWRE4 | ACTIVE | SOIC | DW | 20 | 2000 | RoHS & Green | NIPDAU | Level-1-260C-UNLIM | -40 to 125 | AHC245 | Samples |
| SN74AHC245N | ACTIVE | PDIP | N | 20 | 20 | RoHS & Non-Green | NIPDAU | N / A for Pkg Type | -40 to 125 | SN74AHC245N | Samples |
| SN74AHC245NSR | ACTIVE | SO | NS | 20 | 2000 | RoHS & Green | NIPDAU | Level-1-260C-UNLIM | -40 to 125 | AHC245 | Samples |
| SN74AHC245PW | ACTIVE | TSSOP | PW | 20 | 70 | RoHS & Green | NIPDAU | Level-1-260C-UNLIM | -40 to 125 | HA245 | Samples |
| SN74AHC245PWR | ACTIVE | TSSOP | PW | 20 | 2000 | RoHS & Green | NIPDAU SN | Level-1-260C-UNLIM | -40 to 125 | HA245 | Samples |
| SN74AHC245PWRE4 | ACTIVE | TSSOP | PW | 20 | 2000 | RoHS & Green | NIPDAU | Level-1-260C-UNLIM | -40 to 125 | HA245 | Samples |
| SN74AHC245PWRG4 | ACTIVE | TSSOP | PW | 20 | 2000 | RoHS & Green | NIPDAU | Level-1-260C-UNLIM | -40 to 125 | HA245 | Samples |

| 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 |
|------------------|---------------|--------------|-----------------|------|-------------|---------------------|--------------------------------------|----------------------|--------------|--|-------------------------|
| SNJ54AHC245FK | ACTIVE | LCCC | FK | 20 | 1 | Non-RoHS & Green | SNPB | N / A for Pkg Type | -55 to 125 | 5962- 9681801Q2A SNJ54AHC 245FK | Samples |
| SNJ54AHC245J | ACTIVE | CDIP | J | 20 | 1 | Non-RoHS & Green | SNPB | N / A for Pkg Type | -55 to 125 | 5962-9681801QR A SNJ54AHC245J | Samples |
| SNJ54AHC245W | ACTIVE | CFP | W | 20 | 1 | Non-RoHS & Green | SNPB | N / A for Pkg Type | -55 to 125 | 5962-9681801QS A SNJ54AHC245W | 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.

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 <=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.

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OTHER QUALIFIED VERSIONS OF SN54AHC245, SN54AHC245-SP, SN74AHC245 :

- Catalog : [SN74AHC245](#), [SN54AHC245](#)
- Automotive : [SN74AHC245-Q1](#), [SN74AHC245-Q1](#)
- Enhanced Product : [SN74AHC245-EP](#), [SN74AHC245-EP](#)
- Military : [SN54AHC245](#)
- Space : [SN54AHC245-SP](#)

NOTE: Qualified Version Definitions:

- Catalog - TI's standard catalog product
- Automotive - Q100 devices qualified for high-reliability automotive applications targeting zero defects
- Enhanced Product - Supports Defense, Aerospace and Medical Applications
- Military - QML certified for Military and Defense Applications
- Space - Radiation tolerant, ceramic packaging and qualified for use in Space-based application

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 |
|-----------------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| SN74AHC245DBR | SSOP | DB | 20 | 2000 | 330.0 | 16.4 | 8.2 | 7.5 | 2.5 | 12.0 | 16.0 | Q1 |
| SN74AHC245DGVR | TVSOP | DGV | 20 | 2000 | 330.0 | 12.4 | 6.9 | 5.6 | 1.6 | 8.0 | 12.0 | Q1 |
| SN74AHC245DWR | SOIC | DW | 20 | 2000 | 330.0 | 24.4 | 10.9 | 13.3 | 2.7 | 12.0 | 24.0 | Q1 |
| SN74AHC245NSR | SO | NS | 20 | 2000 | 330.0 | 24.4 | 8.4 | 13.0 | 2.5 | 12.0 | 24.0 | Q1 |
| SN74AHC245PWR | TSSOP | PW | 20 | 2000 | 330.0 | 16.4 | 6.95 | 7.1 | 1.6 | 8.0 | 16.0 | Q1 |
| SN74AHC245PWR | TSSOP | PW | 20 | 2000 | 330.0 | 16.4 | 6.95 | 7.0 | 1.4 | 8.0 | 16.0 | Q1 |
| SN74AHC245PWRG4 | TSSOP | PW | 20 | 2000 | 330.0 | 16.4 | 6.95 | 7.0 | 1.4 | 8.0 | 16.0 | Q1 |

TAPE AND REEL BOX DIMENSIONS


*All dimensions are nominal

| Device | Package Type | Package Drawing | Pins | SPQ | Length (mm) | Width (mm) | Height (mm) |
|------------------|--------------|-----------------|------|------|-------------|------------|-------------|
| SN74AHC245DBR | SSOP | DB | 20 | 2000 | 356.0 | 356.0 | 35.0 |
| SN74AHC245DGVR | TVSOP | DGV | 20 | 2000 | 356.0 | 356.0 | 35.0 |
| SN74AHC245DWR | SOIC | DW | 20 | 2000 | 367.0 | 367.0 | 45.0 |
| SN74AHC245NSR | SO | NS | 20 | 2000 | 367.0 | 367.0 | 45.0 |
| SN74AHC245PWR | TSSOP | PW | 20 | 2000 | 364.0 | 364.0 | 27.0 |
| SN74AHC245PWR | TSSOP | PW | 20 | 2000 | 356.0 | 356.0 | 35.0 |
| SN74AHC245PW RG4 | TSSOP | PW | 20 | 2000 | 356.0 | 356.0 | 35.0 |

TUBE


*All dimensions are nominal

| Device | Package Name | Package Type | Pins | SPQ | L (mm) | W (mm) | T (μm) | B (mm) |
|-----------------|--------------|--------------|------|-----|--------|--------|--------|--------|
| 5962-9681801Q2A | FK | LCCC | 20 | 1 | 506.98 | 12.06 | 2030 | NA |
| 5962-9681801QSA | W | CFP | 20 | 1 | 506.98 | 26.16 | 6220 | NA |
| 5962-9681801VSA | W | CFP | 20 | 25 | 506.98 | 26.16 | 6220 | NA |
| SN74AHC245DW | DW | SOIC | 20 | 25 | 507 | 12.83 | 5080 | 6.6 |
| SN74AHC245N | N | PDIP | 20 | 20 | 506 | 13.97 | 11230 | 4.32 |
| SN74AHC245PW | PW | TSSOP | 20 | 70 | 530 | 10.2 | 3600 | 3.5 |
| SNJ54AHC245FK | FK | LCCC | 20 | 1 | 506.98 | 12.06 | 2030 | NA |
| SNJ54AHC245W | W | CFP | 20 | 1 | 506.98 | 26.16 | 6220 | NA |

J (R-GDIP-T**)

14 LEADS SHOWN

CERAMIC DUAL IN-LINE PACKAGE



| DIM \ PINS ** | 14 | 16 | 18 | 20 |
|---------------|------------------------|------------------------|------------------------|------------------------|
| A | 0.300 (7,62) BSC | 0.300 (7,62) BSC | 0.300 (7,62) BSC | 0.300 (7,62) BSC |
| B MAX | 0.785 (19,94) | .840 (21,34) | 0.960 (24,38) | 1.060 (26,92) |
| B MIN | — | — | — | — |
| C MAX | 0.300 (7,62) | 0.300 (7,62) | 0.310 (7,87) | 0.300 (7,62) |
| C MIN | 0.245 (6,22) | 0.245 (6,22) | 0.220 (5,59) | 0.245 (6,22) |



4040083/F 03/03

- NOTES:
- A. All linear dimensions are in inches (millimeters).
 - B. This drawing is subject to change without notice.
 - C. This package is hermetically sealed with a ceramic lid using glass frit.
 - D. Index point is provided on cap for terminal identification only on press ceramic glass frit seal only.
 - E. Falls within MIL STD 1835 GDIP1-T14, GDIP1-T16, GDIP1-T18 and GDIP1-T20.

DGV (R-PDSO-G**)

PLASTIC SMALL-OUTLINE

24 PINS SHOWN



4073251/E 08/00

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

N (R-PDIP-T**)

PLASTIC DUAL-IN-LINE PACKAGE

16 PINS SHOWN



- NOTES:
- A. All linear dimensions are in inches (millimeters).
 - B. This drawing is subject to change without notice.
 - Falls within JEDEC MS-001, except 18 and 20 pin minimum body length (Dim A).
 - The 20 pin end lead shoulder width is a vendor option, either half or full width.

DW0020A



PACKAGE OUTLINE

SOIC - 2.65 mm max height

SOIC



4220724/A 05/2016

NOTES:

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

EXAMPLE BOARD LAYOUT

DW0020A

SOIC - 2.65 mm max height

SOIC



LAND PATTERN EXAMPLE
SCALE:6X



SOLDER MASK DETAILS

4220724/A 05/2016

NOTES: (continued)

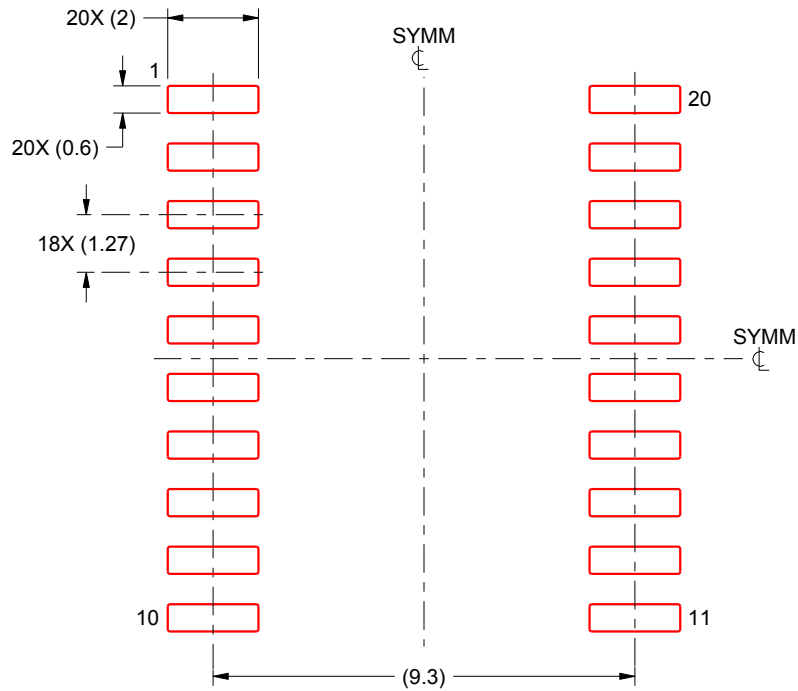
- 6. Publication IPC-7351 may have alternate designs.
- 7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

EXAMPLE STENCIL DESIGN

DW0020A

SOIC - 2.65 mm max height

SOIC



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

4220724/A 05/2016

NOTES: (continued)

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

W (R-GDFP-F20)

CERAMIC DUAL FLATPACK



- NOTES:
- A. All linear dimensions are in inches (millimeters).
 - B. This drawing is subject to change without notice.
 - C. This package can be hermetically sealed with a ceramic lid using glass frit.
 - D. Index point is provided on cap for terminal identification only.
 - E. Falls within Mil-Std 1835 GDFP2-F20

PW0020A



PACKAGE OUTLINE

TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE



4220206/A 02/2017

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.
4. This dimension does not include interlead flash. Interlead flash shall not exceed 0.25 mm per side.
5. Reference JEDEC registration MO-153.

EXAMPLE BOARD LAYOUT

PW0020A

TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE: 10X



SOLDER MASK DETAILS

4220206/A 02/2017

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

PW0020A

TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE



SOLDER PASTE EXAMPLE
BASED ON 0.125 mm THICK STENCIL
SCALE: 10X

4220206/A 02/2017

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.

PW (R-PDSO-G20)

PLASTIC SMALL OUTLINE



- NOTES:
- A. All linear dimensions are in millimeters.
 - B. This drawing is subject to change without notice.
 - C. Publication IPC-7351 is recommended for alternate design.
 - D. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Refer to IPC-7525 for other stencil recommendations.
 - E. Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.

DB0020A



PACKAGE OUTLINE

SSOP - 2 mm max height

SMALL OUTLINE PACKAGE



4214851/B 08/2019

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.
4. This dimension does not include interlead flash. Interlead flash shall not exceed 0.25 mm per side.
5. Reference JEDEC registration MO-150.

EXAMPLE BOARD LAYOUT

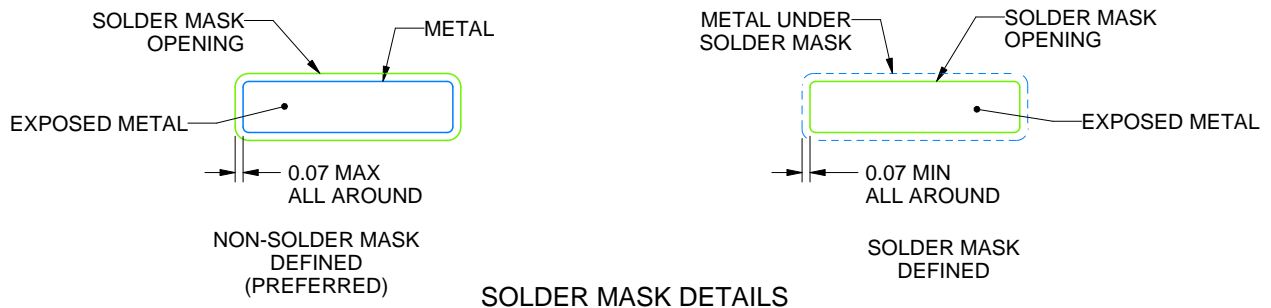
DB0020A

SSOP - 2 mm max height

SMALL OUTLINE PACKAGE



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE: 10X



4214851/B 08/2019

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

DB0020A

SSOP - 2 mm max height

SMALL OUTLINE PACKAGE



SOLDER PASTE EXAMPLE
BASED ON 0.125 mm THICK STENCIL
SCALE: 10X

4214851/B 08/2019

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.

GENERIC PACKAGE VIEW

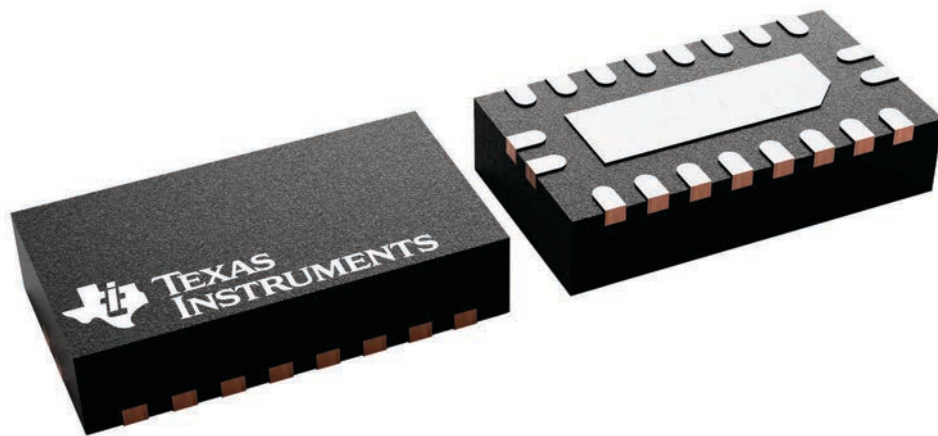
RKS 20

VQFN - 1 mm max height

2.5 x 4.5, 0.5 mm pitch

PLASTIC QUAD FLATPACK - NO LEAD

This image is a representation of the package family, actual package may vary.
Refer to the product data sheet for package details.



4226872/A

MECHANICAL DATA

NS (R-PDSO-G**)

PLASTIC SMALL-OUTLINE PACKAGE

14-PINS SHOWN



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

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