



CD54HC4051, CD74HC4051, CD54HCT4051, CD74HCT4051, CD54HC4052, CD74HC4052, CD54HCT4052, CD74HCT4052, CD54HC4053, CD74HC4053, CD54HCT4053, CD74HCT4053

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## CDx4HC405x、CD4HCT405x 高速 CMOS ロジック アナログ マルチプレクサおよびデマルチプレクサ

### 1 特長

- 車載アプリケーション認定済み
- 幅広いアナログ入力電圧範囲:  $\pm 5V$  (最大値)
- 低オン抵抗:
  - $70\Omega$  ( $V_{CC} - V_{EE} = 4.5V$  での標準値)
  - $40\Omega$  ( $V_{CC} - V_{EE} = 9V$  での標準値)
- スイッチ間の低いクロストーク
- 高速なスイッチングおよび伝搬速度
- ブレイク ビフォー メイクのスイッチング動作
- 広い動作温度範囲:  
 $-40^{\circ}C \sim +125^{\circ}C$
- 動作制御電圧:  $4.5V \sim 5.5V$
- スイッチ電圧:  $0V \sim 10V$
- LSTTL 入力ロジックと直接互換、  
 $V_{IL} = 0.8V$  (最大値)、 $V_{IH} = 2V$  (最小値)
- CMOS 入力互換、  
 $V_{OL}$ 、 $V_{OH}$  で  $I_L \leq 1\mu A$

### 2 アプリケーション

- デジタル ラジオ
- 信号ゲーティング
- ファクトリ オートメーション
- テレビ
- 電化製品
- プログラマブル ロジック回路
- センサ

### 3 概要

この CDx4HC405x および CDx4HCT405x デバイスはデジタル制御のアナログ スイッチで、シリコン ゲート CMOS テクノロジを使用し、標準 CMOS IC の低い消費電力で LSTTL と同様の動作速度を実現しています。

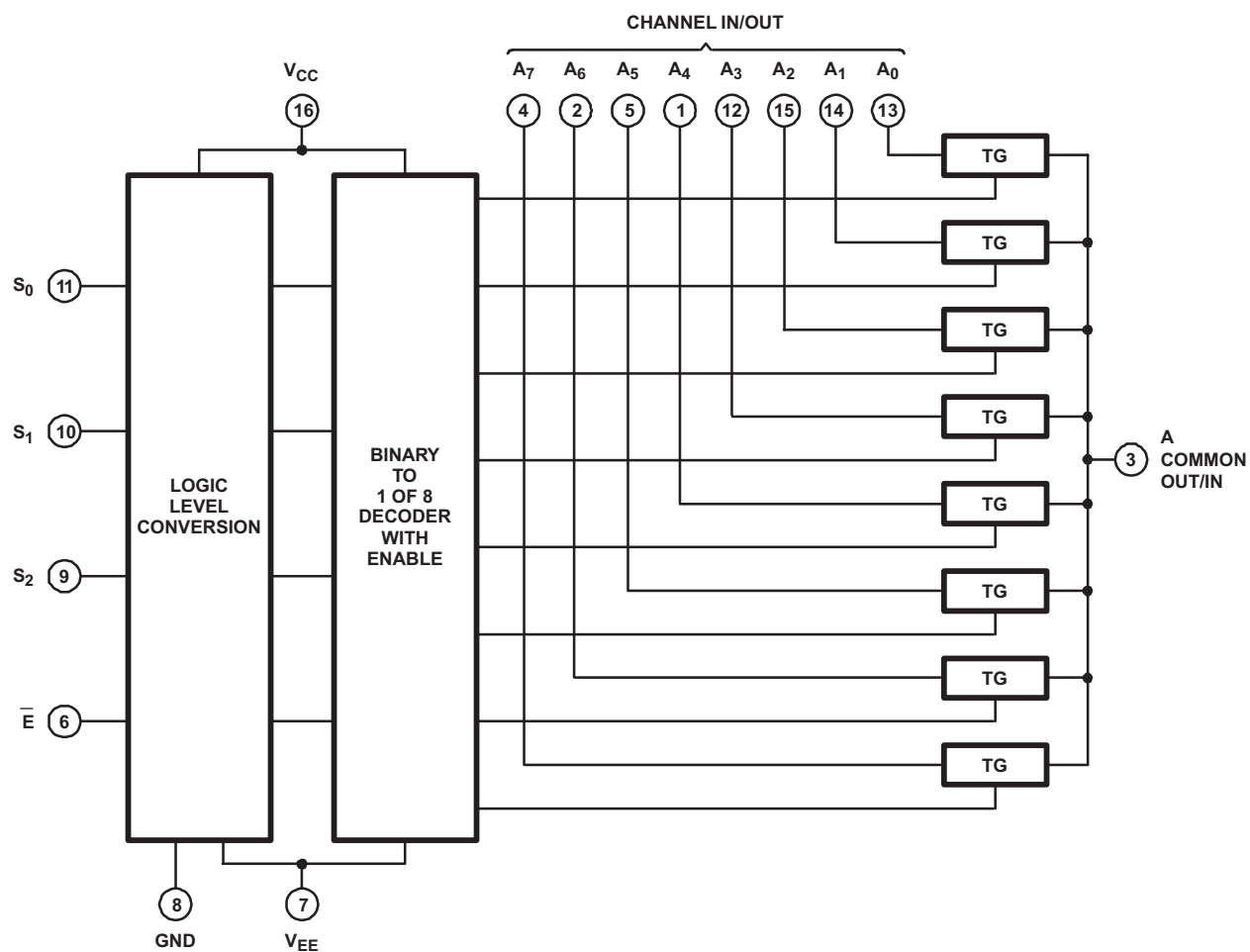
このアナログ マルチプレクサおよびデマルチプレクサは、電圧電源範囲 (例:  $V_{CC}$  から  $V_{EE}$  まで) にわたって変化する可能性があるアナログ電圧を制御します。これは双方向のスイッチで、任意のアナログ入力を出力として使用でき、その逆も行えます。このスイッチはオン抵抗が低く、オフ時のリーク電流が小さい特長があります。さらに、High のときにすべてのスイッチをオフ状態に無効化するディセーブル制御を備えています。

#### 製品情報

| 部品番号        | T <sub>A</sub> | パッケージ (1)     | パッケージ サイズ(2)     |
|-------------|----------------|---------------|------------------|
| CD54HCx405x | -55℃～125℃      | J (CDIP、16)   | 19.56mm × 6.92mm |
| CD74HCx405x |                | N (PDIP、16)   | 19.30mm × 6.35mm |
|             |                | D (SOIC、16)   | 9.9mm × 3.9mm    |
|             |                | NS (SOP、16)   | 10.3mm × 5.3mm   |
|             |                | PW (TSSOP、16) | 5mm × 4.4mm      |

- (1) 詳細については、[セクション 11](#) を参照してください。
- (2) パッケージ サイズ (長さ × 幅) は公称値であり、該当する場合はピンも含まれます。





HCT4051 の機能図

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## 4 Pin Configuration and Functions

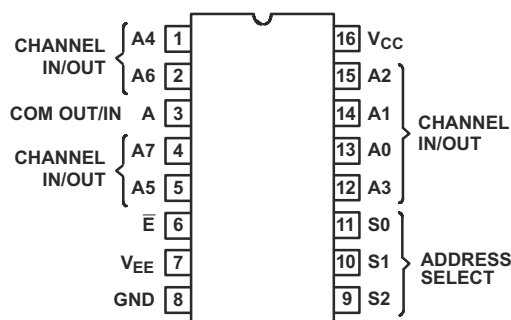
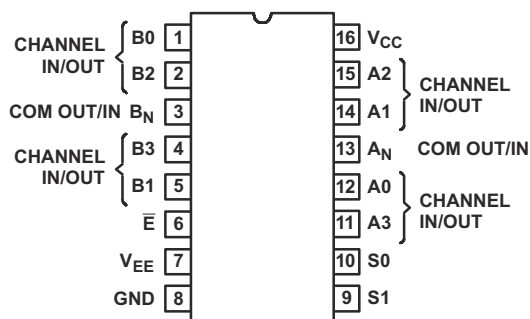


图 4-1. CDx4HCx4051 J, N, D, NS, PW Packages 16-Pin CDIP, PDIP, SOIC, SO, TSSOP (Top View)

表 4-1. Pin Functions for CDxHCx4051B

| PIN          |     | TYPE <sup>(1)</sup> | DESCRIPTION                  |
|--------------|-----|---------------------|------------------------------|
| NAME         | NO. |                     |                              |
| CH A4 IN/OUT | 1   | I/O                 | Channel 4 in/out             |
| CH A6 IN/OUT | 2   | I/O                 | Channel 6 in/out             |
| COM OUT/IN   | 3   | I/O                 | Common out/in                |
| CH A7 IN/OUT | 4   | I/O                 | Channel 7 in/out             |
| CH A5 IN/OUT | 5   | I/O                 | Channel 5 in/out             |
| !E           | 6   | I                   | Enable Channels (Active Low) |
| VEE          | 7   | —                   | Negative power input         |
| GND          | 8   | —                   | Ground                       |
| S2           | 9   | I                   | Channel select 2             |
| S1           | 10  | I                   | Channel select 1             |
| S0           | 11  | I                   | Channel select 0             |
| CH A3 IN/OUT | 12  | I/O                 | Channel 3 in/out             |
| CH A0 IN/OUT | 13  | I/O                 | Channel 0 in/out             |
| CH A1 IN/OUT | 14  | I/O                 | Channel 1 in/out             |
| CH A2 IN/OUT | 15  | I/O                 | Channel 2 in/out             |
| VCC          | 16  | —                   | Positive power input         |

(1) I = input, O = output



4-2. CDx4HCx4052 J, N, D, NS, PW Packages 16-Pin CDIP, PDIP, SOIC, SO, TSSOP (Top View)

表 4-2. Pin Functions for CDx4HCx4052B

| PIN          |     | TYPE <sup>(1)</sup> | DESCRIPTION                  |
|--------------|-----|---------------------|------------------------------|
| NAME         | NO. |                     |                              |
| CH B0 IN/OUT | 1   | I/O                 | Channel B0 in/out            |
| CH B2 IN/OUT | 2   | I/O                 | Channel B2 in/out            |
| COM B OUT/IN | 3   | I/O                 | B common out/in              |
| CH B3 IN/OUT | 4   | I/O                 | Channel B3 in/out            |
| CH B1 IN/OUT | 5   | I/O                 | Channel B1 in/out            |
| !E           | 6   | I                   | Enable channels (Active Low) |
| VEE          | 7   | —                   | Negative power input         |
| GND          | 8   | —                   | Ground                       |
| S1           | 9   | I                   | Channel select 1             |
| S0           | 10  | I                   | Channel select 0             |
| CH A3 IN/OUT | 11  | I/O                 | Channel A3 in/out            |
| CH A0 IN/OUT | 12  | I/O                 | Channel A0 in/out            |
| COM A IN/OUT | 13  | I/O                 | A common out/in              |
| CH A1 IN/OUT | 14  | I/O                 | Channel A1 in/out            |
| CH A2 IN/OUT | 15  | I/O                 | Channel A2 in/out            |
| VCC          | 16  | —                   | Positive power input         |

(1) I = input, O = output

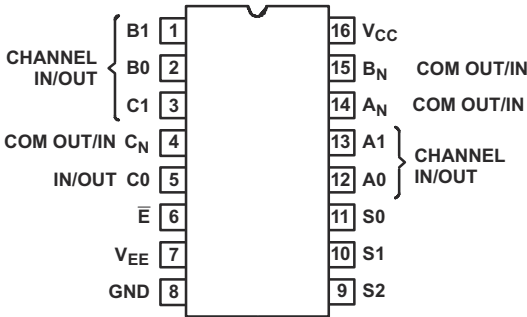


図 4-3. CDx4HCx4053 J, N, D, NS, PW Packages 16-Pin CDIP, PDIP, SOIC, SO, TSSOP (Top View)

表 4-3. Pin Functions CDx4HCx4053B

| PIN             |     | TYPE <sup>(1)</sup> | DESCRIPTION                  |
|-----------------|-----|---------------------|------------------------------|
| NAME            | NO. |                     |                              |
| B1 IN/OUT       | 1   | I/O                 | B channel Y in/out           |
| B0 IN/OUT       | 2   | I/O                 | B channel X in/out           |
| C1 IN/OUT       | 3   | I/O                 | C channel Y in/out           |
| COM C OUT/IN    | 4   | I/O                 | C common out/in              |
| C0 IN/OUT       | 5   | I/O                 | C channel X in/out           |
| $\bar{E}$       | 6   | I                   | Enable channels (Active Low) |
| V <sub>EE</sub> | 7   | —                   | Negative power input         |
| GND             | 8   | —                   | Ground                       |
| S2              | 9   | I                   | Channel select 2             |
| S1              | 10  | I                   | Channel select 1             |
| S0              | 11  | I                   | Channel select 0             |
| A0 IN/OUT       | 12  | I/O                 | A channel X in/out           |
| A1 IN/OUT       | 13  | I/O                 | A channel Y in/out           |
| COM A OUT/IN    | 14  | I/O                 | A common out/in              |
| COM B OUT/IN    | 15  | I/O                 | B common out/in              |
| V <sub>CC</sub> | 16  | —                   | Positive power input         |

(1) I = input, O = output

## 5 Specifications

### 5.1 Absolute Maximum Ratings

over operating free-air temperature range (unless otherwise noted)<sup>(1)</sup>

|                       |                                                               |                                                | MIN  | MAX  | UNIT |
|-----------------------|---------------------------------------------------------------|------------------------------------------------|------|------|------|
| $V_{CC} - V_{EE}$     | DC Supply voltage                                             |                                                | -0.5 | 10.5 | V    |
| $V_{CC}$              |                                                               |                                                | -0.5 | 7    | V    |
| $V_{EE}$              |                                                               |                                                | 0.5  | -7   | V    |
| $I_{IK}$              | DC input diode current                                        | $V_I < -0.5V$ or $V_I > V_{CC} + 0.5V$         | -20  | 20   | mA   |
| $I_{OK}$              | DC switch diode current                                       | $V_I < V_{EE} - 0.5V$ or $V_I > V_{CC} + 0.5V$ | -20  | 20   | mA   |
|                       | DC switch current <sup>(2)</sup>                              | $V_I < V_{EE} - 0.5V$ or $V_I > V_{CC} + 0.5V$ | -25  | 25   | mA   |
| $I_{CC}$              | DC $V_{CC}$ or ground current                                 |                                                | -50  | 50   | mA   |
| $I_{EE}$              | DC $V_{EE}$ current                                           |                                                | -20  |      | mA   |
| $V_{SEL}$ or $V_{EN}$ | Logic control input pin voltage ( $\overline{EN}$ , Ax, SELx) |                                                | -0.5 | 30   | V    |
| $T_{JMAX}$            | Maximum junction temperature                                  |                                                |      | 150  | °C   |
| $T_{LMAX}$            | Maximum lead temperature                                      | Soldering 10 s                                 |      | 300  | °C   |
| $T_{stg}$             | Storage temperature                                           |                                                | -65  | 150  | °C   |

(1) Stresses beyond those listed under *Absolute Maximum Rating* 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 Condition*. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

(2) All voltages are with respect to ground, unless otherwise specified.

### 5.2 ESD Ratings

|             |                         |                                                                                          | VALUE | UNIT |
|-------------|-------------------------|------------------------------------------------------------------------------------------|-------|------|
| $V_{(ESD)}$ | Electrostatic discharge | Human body model (HBM), per ANSI/ESDA/JEDEC JS-001, all pins <sup>(1)</sup>              | ±500  | V    |
|             |                         | Charged device model (CDM), per JEDEC specification JESD22-C101, all pins <sup>(2)</sup> | ±200  |      |

(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.

### 5.3 Thermal Information

| THERMAL METRIC <sup>(1)</sup> |                                              | CD74HC4051 |         |            | UNIT |
|-------------------------------|----------------------------------------------|------------|---------|------------|------|
|                               |                                              | N (PDIP)   | NS (SO) | PW (TSSOP) |      |
|                               |                                              | 16 PINS    | 16 PINS | 16 PINS    |      |
| $R_{\theta JA}$               | Junction-to-ambient thermal resistance       | 77.3       | 99.3    | 116.5      | °C/W |
| $R_{\theta JC(top)}$          | Junction-to-case (top) thermal resistance    | 56.2       | 59.6    | 51.9       | °C/W |
| $R_{\theta JB}$               | Junction-to-board thermal resistance         | 52.6       | 65.7    | 73.9       | °C/W |
| $\Psi_{JT}$                   | Junction-to-top characterization parameter   | 33.7       | 21.5    | 4.7        | °C/W |
| $\Psi_{JB}$                   | Junction-to-board characterization parameter | 52.1       | 65.1    | 73.2       | °C/W |

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

### 5.4 Recommended Operating Conditions

over operating free-air temperature range (unless otherwise noted)<sup>(1)</sup>

|                   |                                                                               |                                           | MIN      | NOM | MAX      | UNIT |
|-------------------|-------------------------------------------------------------------------------|-------------------------------------------|----------|-----|----------|------|
| $V_{CC}$          | Supply voltage range ( $T_A$ = full package temperature range) <sup>(2)</sup> | CD54 and 74HC types                       | 2        |     | 6        | V    |
|                   |                                                                               | CD54 and 74HCT types                      | 4.5      |     | 5.5      |      |
| $V_{CC} - V_{EE}$ | Supply voltage range ( $T_A$ = full package temperature range)                | CD54 and 74HC types, CD54 and 74HCT types | 2        |     | 10       | V    |
| $V_{EE}$          | Supply voltage range ( $T_A$ = full package temperature range) <sup>(3)</sup> | CD54 and 74HC types, CD54 and 74HCT types | 0        |     | –6       | V    |
| $V_I$             | DC input control voltage                                                      |                                           | 0        |     | $V_{CC}$ | V    |
| $V_{IS}$          | Analog switch I/O voltage                                                     |                                           | $V_{EE}$ |     | $V_{CC}$ | V    |
| $T_A$             | Ambient temperature                                                           |                                           | –55      |     | 125      | °C   |
| $t_r, t_f$        | Input rise and fall times                                                     | 2V                                        | 0        |     | 1000     | ns   |
|                   |                                                                               | 4.5V                                      | 0        |     | 500      |      |
|                   |                                                                               | 6V                                        | 0        |     | 400      |      |

- (1) For maximum reliability, nominal operating conditions must be selected so that operation is always within the ranges specified in the *Recommended Operating Conditions* table.
- (2) All voltages referenced to GND unless otherwise specified.
- (3) In certain applications, the external load resistor current may include both  $V_{CC}$  and signal line components. To avoid drawing  $V_{CC}$  current when switch current flows into the transmission gate inputs, the voltage drop across the bidirectional switch must not exceed 0.6V (calculated from  $r_{ON}$  values shown in *Electrical Characteristics HC* and *Electrical Characteristics HCT* tables). No  $V_{CC}$  current will flow through  $R_L$  if the switch current flows into terminal 3 on the HC and HCT40511; terminals 3 and 13 on the HC and HCT4052; terminals 4, 14, and 15 on the HC and HCT4053.

## 5.5 Electrical Characteristics: HC Devices

Over operating free-air temperature range,  $V_{\text{SUPPLY}} = \pm 5\text{V}$ , and  $R_L = 100\Omega$ , (unless otherwise noted)

| PARAMETER                                 |  | TEST CONDITIONS     |                    |                     |                     |                 | MIN  | TYP  | MAX | UNIT |
|-------------------------------------------|--|---------------------|--------------------|---------------------|---------------------|-----------------|------|------|-----|------|
| CD74HC405x                                |  |                     |                    |                     |                     |                 |      |      |     |      |
|                                           |  | V <sub>IS</sub> (V) | V <sub>I</sub> (V) | V <sub>EE</sub> (V) | V <sub>CC</sub> (V) | T <sub>A</sub>  |      |      |     |      |
| Input High Voltage, V <sub>IH</sub> , Min |  |                     |                    |                     | 2                   | 25°C            | 1.5  |      | V   |      |
|                                           |  |                     |                    |                     |                     | −40°C to +85°C  | 1.5  |      |     |      |
|                                           |  |                     |                    |                     |                     | −55°C to +125°C | 1.5  |      |     |      |
|                                           |  |                     |                    |                     | 4.5                 | 25°C            | 3.15 |      |     |      |
|                                           |  |                     |                    |                     |                     | −40°C to +85°C  | 3.15 |      |     |      |
|                                           |  |                     |                    |                     |                     | −55°C to +125°C | 3.15 |      |     |      |
|                                           |  |                     |                    |                     | 6                   | 25°C            | 4.2  |      |     |      |
|                                           |  |                     |                    |                     |                     | −40°C to +85°C  | 4.2  |      |     |      |
|                                           |  |                     |                    |                     |                     | −55°C to +125°C | 4.2  |      |     |      |
| Input Low Voltage, V <sub>IL</sub> , Max  |  |                     |                    |                     | 2                   | 25°C            |      | 0.5  | V   |      |
|                                           |  |                     |                    |                     |                     | −40°C to +85°C  |      | 0.5  |     |      |
|                                           |  |                     |                    |                     |                     | −55°C to +125°C |      | 0.5  |     |      |
|                                           |  |                     |                    |                     | 4.5                 | 25°C            |      | 1.35 |     |      |
|                                           |  |                     |                    |                     |                     | −40°C to +85°C  |      | 1.35 |     |      |
|                                           |  |                     |                    |                     |                     | −55°C to +125°C |      | 1.35 |     |      |
|                                           |  |                     |                    |                     | 6                   | 25°C            |      | 1.8  |     |      |
|                                           |  |                     |                    |                     |                     | −40°C to +85°C  |      | 1.8  |     |      |
|                                           |  |                     |                    |                     |                     | −55°C to +125°C |      | 1.8  |     |      |

## 5.5 Electrical Characteristics: HC Devices (続き)

Over operating free-air temperature range,  $V_{\text{SUPPLY}} = \pm 5\text{V}$ , and  $R_L = 100\Omega$ , (unless otherwise noted)

| PARAMETER                                                                   | TEST CONDITIONS             |                                    |                                    |                                    |                                    |                 | MIN | TYP             | MAX      | UNIT |
|-----------------------------------------------------------------------------|-----------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|-----------------|-----|-----------------|----------|------|
| $r_{\text{ON}}$<br>ON resistance                                            | $I_{\text{O}} = 1\text{mA}$ | $V_{\text{CC}}$ or $V_{\text{EE}}$ | $V_{\text{IL}}$ or $V_{\text{IH}}$ | 0                                  | 4.5                                | 25°C            | 70  | 160             | $\Omega$ |      |
|                                                                             |                             |                                    |                                    |                                    |                                    | –40°C to +85°C  | 200 |                 |          |      |
|                                                                             |                             |                                    |                                    |                                    |                                    | –55°C to +125°C | 240 |                 |          |      |
|                                                                             |                             |                                    |                                    | 0                                  | 6                                  | 25°C            | 60  | 140             |          |      |
|                                                                             |                             |                                    |                                    |                                    |                                    | –40°C to +85°C  | 175 |                 |          |      |
|                                                                             |                             |                                    |                                    |                                    |                                    | –55°C to +125°C | 210 |                 |          |      |
|                                                                             |                             | –4.5                               | 4.5                                | 25°C                               | 40                                 | 120             |     |                 |          |      |
|                                                                             |                             |                                    |                                    | –40°C to +85°C                     | 150                                |                 |     |                 |          |      |
|                                                                             |                             |                                    |                                    | –55°C to +125°C                    | 180                                |                 |     |                 |          |      |
|                                                                             |                             |                                    |                                    | $V_{\text{CC}}$ to $V_{\text{EE}}$ | $V_{\text{IL}}$ or $V_{\text{IH}}$ | 0               | 4.5 | 25°C            | 90       | 180  |
|                                                                             |                             |                                    |                                    |                                    |                                    |                 |     | –40°C to +85°C  | 225      |      |
|                                                                             |                             |                                    |                                    |                                    |                                    |                 |     | –55°C to +125°C | 270      |      |
| 0                                                                           | 6                           | 25°C                               | 80                                 |                                    |                                    | 160             |     |                 |          |      |
|                                                                             |                             | –40°C to +85°C                     | 200                                |                                    |                                    |                 |     |                 |          |      |
|                                                                             |                             | –55°C to +125°C                    | 240                                |                                    |                                    |                 |     |                 |          |      |
| –4.5                                                                        | 4.5                         | 25°C                               | 45                                 | 130                                |                                    |                 |     |                 |          |      |
|                                                                             |                             | –40°C to +85°C                     | 162                                |                                    |                                    |                 |     |                 |          |      |
|                                                                             |                             | –55°C to +125°C                    | 195                                |                                    |                                    |                 |     |                 |          |      |
| $\Delta r_{\text{ON}}$<br>Maximum ON resistance<br>between any two channels |                             |                                    |                                    | 0                                  | 4.5                                | 25°C            | 10  | $\Omega$        |          |      |
|                                                                             |                             |                                    |                                    | 0                                  | 6                                  | 25°C            | 8.5 |                 |          |      |
|                                                                             |                             |                                    |                                    | –4.5                               | 4.5                                | 25°C            | 5   |                 |          |      |

## 5.5 Electrical Characteristics: HC Devices (続き)

Over operating free-air temperature range,  $V_{\text{SUPPLY}} = \pm 5\text{V}$ , and  $R_L = 100\Omega$ , (unless otherwise noted)

| PARAMETER                                        | TEST CONDITIONS    |                                                                                                                                                                                                                                                                             |                                    |    |   |                | MIN | TYP | MAX  | UNIT |
|--------------------------------------------------|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|----|---|----------------|-----|-----|------|------|
| I <sub>IZ</sub><br>Switch ON/OFF leakage current | 1 and 2 channels   | For switch OFF: When V <sub>IS</sub> = V <sub>CC</sub> , V <sub>OS</sub> = V <sub>EE</sub> ; When V <sub>IS</sub> = V <sub>EE</sub> , V <sub>OS</sub> = V <sub>CC</sub> , For switch ON: All applicable combination s of V <sub>IS</sub> and V <sub>OS</sub> voltage levels | V <sub>IL</sub> or V <sub>IH</sub> | 0  | 6 | 25°C           |     |     | ±0.1 | μA   |
|                                                  |                    |                                                                                                                                                                                                                                                                             |                                    |    |   | –55°C to 85°C  |     |     | ±1   |      |
|                                                  |                    |                                                                                                                                                                                                                                                                             |                                    |    |   | –55°C to 125°C |     |     | ±1   |      |
|                                                  | 4053               |                                                                                                                                                                                                                                                                             |                                    | -5 | 5 | 25°C           |     |     | ±0.1 |      |
|                                                  |                    |                                                                                                                                                                                                                                                                             |                                    |    |   | –55°C to 85°C  |     |     | ±1   |      |
|                                                  |                    |                                                                                                                                                                                                                                                                             |                                    |    |   | –55°C to 125°C |     |     | ±1   |      |
|                                                  | 4 channels         |                                                                                                                                                                                                                                                                             |                                    | 0  | 6 | 25°C           |     |     | ±0.1 |      |
|                                                  |                    |                                                                                                                                                                                                                                                                             |                                    |    |   | –55°C to 85°C  |     |     | ±1   |      |
|                                                  |                    |                                                                                                                                                                                                                                                                             |                                    |    |   | –55°C to 125°C |     |     | ±1   |      |
|                                                  | 4052               |                                                                                                                                                                                                                                                                             |                                    | -5 | 5 | 25°C           |     |     | ±0.2 |      |
|                                                  |                    |                                                                                                                                                                                                                                                                             |                                    |    |   | –55°C to 85°C  |     |     | ±2   |      |
|                                                  |                    |                                                                                                                                                                                                                                                                             |                                    |    |   | –55°C to 125°C |     |     | ±2   |      |
|                                                  | 8 channels         |                                                                                                                                                                                                                                                                             |                                    | 0  | 6 | 25°C           |     |     | ±0.2 |      |
|                                                  |                    |                                                                                                                                                                                                                                                                             |                                    |    |   | –55°C to 85°C  |     |     | ±2   |      |
|                                                  |                    |                                                                                                                                                                                                                                                                             |                                    |    |   | –55°C to 125°C |     |     | ±2   |      |
|                                                  | 4051               |                                                                                                                                                                                                                                                                             |                                    | -5 | 5 | 25°C           |     |     | ±0.4 |      |
|                                                  |                    |                                                                                                                                                                                                                                                                             |                                    |    |   | –55°C to 85°C  |     |     | ±4   |      |
|                                                  |                    |                                                                                                                                                                                                                                                                             |                                    |    |   | –55°C to 125°C |     |     | ±4   |      |
| I <sub>IL</sub><br>Control input leakage current |                    |                                                                                                                                                                                                                                                                             | V <sub>CC</sub> or GND             | 0  | 6 | 25°C           |     |     | ±0.1 | μA   |
|                                                  |                    |                                                                                                                                                                                                                                                                             |                                    |    |   | –55°C to 85°C  |     |     | ±1   |      |
|                                                  |                    |                                                                                                                                                                                                                                                                             |                                    |    |   | –55°C to 125°C |     |     | ±1   |      |
| Quiescent Device Current, I <sub>CC</sub> Max    | I <sub>O</sub> = 0 | When V <sub>IS</sub> = V <sub>EE</sub> , V <sub>OS</sub> = V <sub>CC</sub>                                                                                                                                                                                                  | V <sub>CC</sub> or GND             | 0  | 6 | 25°C           |     |     | 12   | μA   |
|                                                  |                    |                                                                                                                                                                                                                                                                             |                                    |    |   | –55°C to 85°C  |     |     | 80   |      |
|                                                  |                    |                                                                                                                                                                                                                                                                             |                                    |    |   | –55°C to 125°C |     |     | 160  |      |
|                                                  |                    | When V <sub>IS</sub> = V <sub>CC</sub> , V <sub>OS</sub> = V <sub>EE</sub>                                                                                                                                                                                                  |                                    | -5 | 5 | 25°C           |     |     | 32   |      |
|                                                  |                    |                                                                                                                                                                                                                                                                             |                                    |    |   | –55°C to 85°C  |     |     | 160  |      |
|                                                  |                    |                                                                                                                                                                                                                                                                             |                                    |    |   | –55°C to 125°C |     |     | 320  |      |

## 5.6 Electrical Characteristics: HCT Devices

Over operating free-air temperature range,  $V_{\text{SUPPLY}} = \pm 5\text{V}$ , and  $R_L = 100\Omega$ , (unless otherwise noted)<sup>(1)</sup>

| PARAMETER                                                             |                      | TEST CONDITIONS                    |                                    |                     |                     |                 | MIN             | TYP | MAX | UNIT |     |
|-----------------------------------------------------------------------|----------------------|------------------------------------|------------------------------------|---------------------|---------------------|-----------------|-----------------|-----|-----|------|-----|
| CD74HCT405x                                                           |                      |                                    |                                    |                     |                     |                 |                 |     |     |      |     |
|                                                                       |                      | V <sub>IS</sub> (V)                | V <sub>I</sub> (V)                 | V <sub>EE</sub> (V) | V <sub>CC</sub> (V) | T <sub>A</sub>  |                 |     |     |      |     |
| Input High Voltage, V <sub>IH</sub> , Min                             |                      |                                    |                                    |                     | 4.5 to 5.5          | 25°C            |                 | 2   |     | V    |     |
|                                                                       |                      |                                    |                                    |                     |                     | –40°C to +85°C  |                 | 2   |     |      |     |
|                                                                       |                      |                                    |                                    |                     |                     | –55°C to +125°C |                 | 2   |     |      |     |
| Input Low Voltage, V <sub>IL</sub> , Max                              |                      |                                    |                                    |                     | 4.5 to 5.5          | 25°C            |                 | 0.8 |     | V    |     |
|                                                                       |                      |                                    |                                    |                     |                     | –40°C to +85°C  |                 | 0.8 |     |      |     |
|                                                                       |                      |                                    |                                    |                     |                     | –55°C to +125°C |                 | 0.8 |     |      |     |
| r <sub>ON</sub><br>ON resistance                                      | I <sub>O</sub> = 1mA | V <sub>CC</sub> or V <sub>EE</sub> | V <sub>IL</sub> or V <sub>IH</sub> | 0                   | 4.5                 | 25°C            |                 | 70  | 160 | Ω    |     |
|                                                                       |                      |                                    |                                    |                     |                     | –40°C to +85°C  |                 |     | 200 |      |     |
|                                                                       |                      |                                    |                                    |                     |                     | –55°C to +125°C |                 |     | 240 |      |     |
|                                                                       |                      |                                    |                                    |                     | –4.5                | 4.5             | 25°C            |     | 40  |      | 120 |
|                                                                       |                      |                                    |                                    |                     |                     |                 | –40°C to +85°C  |     |     |      | 150 |
|                                                                       |                      |                                    |                                    |                     |                     |                 | –55°C to +125°C |     |     |      | 180 |
|                                                                       |                      | V <sub>CC</sub> to V <sub>EE</sub> |                                    | 0                   | 4.5                 | 25°C            |                 | 90  | 180 |      |     |
|                                                                       |                      |                                    |                                    |                     |                     | –40°C to +85°C  |                 |     | 225 |      |     |
|                                                                       |                      |                                    |                                    |                     |                     | –55°C to +125°C |                 |     | 270 |      |     |
|                                                                       |                      |                                    |                                    | –4.5                | 4.5                 | 25°C            |                 | 45  | 130 |      |     |
|                                                                       |                      |                                    |                                    |                     |                     | –40°C to +85°C  |                 |     | 162 |      |     |
|                                                                       |                      |                                    |                                    |                     |                     | –55°C to +125°C |                 |     | 195 |      |     |
| Δr <sub>ON</sub><br>Maximum ON resistance<br>between any two channels |                      |                                    |                                    | 0                   | 4.5                 | 25°C            |                 | 10  | Ω   |      |     |
|                                                                       |                      |                                    |                                    | –4.5                | 4.5                 | 25°C            |                 | 5   |     |      |     |

## 5.6 Electrical Characteristics: HCT Devices (続き)

Over operating free-air temperature range,  $V_{SUPPLY} = \pm 5V$ , and  $R_L = 100\Omega$ , (unless otherwise noted)<sup>(1)</sup>

| PARAMETER                                                                                      | TEST CONDITIONS    |                                                                                                                                                                                                                                                                             |                                    |      |            |                | MIN | TYP | MAX  | UNIT |
|------------------------------------------------------------------------------------------------|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|------|------------|----------------|-----|-----|------|------|
| I <sub>I<sub>Z</sub></sub><br>Switch ON/OFF leakage current                                    | 1 and 2 channels   | For switch OFF: When V <sub>IS</sub> = V <sub>CC</sub> , V <sub>OS</sub> = V <sub>EE</sub> ; When V <sub>IS</sub> = V <sub>EE</sub> , V <sub>OS</sub> = V <sub>CC</sub> , For switch ON: All applicable combination s of V <sub>IS</sub> and V <sub>OS</sub> voltage levels | V <sub>IL</sub> or V <sub>IH</sub> | 0    | 6          | 25°C           |     |     | ±0.1 | μA   |
|                                                                                                |                    |                                                                                                                                                                                                                                                                             |                                    |      |            | –55°C to 85°C  |     |     | ±1   |      |
|                                                                                                |                    |                                                                                                                                                                                                                                                                             |                                    |      |            | –55°C to 125°C |     |     | ±1   |      |
|                                                                                                | 4053               |                                                                                                                                                                                                                                                                             |                                    | -5   | 5          | 25°C           |     |     | ±0.1 |      |
|                                                                                                |                    |                                                                                                                                                                                                                                                                             |                                    |      |            | –55°C to 85°C  |     |     | ±1   |      |
|                                                                                                |                    |                                                                                                                                                                                                                                                                             |                                    |      |            | –55°C to 125°C |     |     | ±1   |      |
|                                                                                                | 4 channels         |                                                                                                                                                                                                                                                                             |                                    | 0    | 6          | 25°C           |     |     | ±0.1 |      |
|                                                                                                |                    |                                                                                                                                                                                                                                                                             |                                    |      |            | –55°C to 85°C  |     |     | ±1   |      |
|                                                                                                |                    |                                                                                                                                                                                                                                                                             |                                    |      |            | –55°C to 125°C |     |     | ±1   |      |
|                                                                                                | 4052               |                                                                                                                                                                                                                                                                             |                                    | -5   | 5          | 25°C           |     |     | ±0.2 |      |
|                                                                                                |                    |                                                                                                                                                                                                                                                                             |                                    |      |            | –55°C to 85°C  |     |     | ±2   |      |
|                                                                                                |                    |                                                                                                                                                                                                                                                                             |                                    |      |            | –55°C to 125°C |     |     | ±2   |      |
|                                                                                                | 8 channels         |                                                                                                                                                                                                                                                                             |                                    | 0    | 6          | 25°C           |     |     | ±0.2 |      |
|                                                                                                |                    |                                                                                                                                                                                                                                                                             |                                    |      |            | –55°C to 85°C  |     |     | ±2   |      |
|                                                                                                |                    |                                                                                                                                                                                                                                                                             |                                    |      |            | –55°C to 125°C |     |     | ±2   |      |
|                                                                                                | 4051               |                                                                                                                                                                                                                                                                             |                                    | -5   | 5          | 25°C           |     |     | ±0.4 |      |
|                                                                                                |                    |                                                                                                                                                                                                                                                                             |                                    |      |            | –55°C to 85°C  |     |     | ±4   |      |
|                                                                                                |                    |                                                                                                                                                                                                                                                                             |                                    |      |            | –55°C to 125°C |     |     | ±4   |      |
| I <sub>IL</sub><br>Control input leakage current                                               |                    |                                                                                                                                                                                                                                                                             | See <sup>(1)</sup>                 | 0    | 5.5        | 25°C           |     |     | ±0.1 | μA   |
|                                                                                                |                    |                                                                                                                                                                                                                                                                             |                                    |      |            | –55°C to 85°C  |     |     | ±1   |      |
|                                                                                                |                    |                                                                                                                                                                                                                                                                             |                                    |      |            | –55°C to 125°C |     |     | ±1   |      |
|                                                                                                |                    |                                                                                                                                                                                                                                                                             |                                    |      |            |                |     |     |      |      |
| Quiescent Device Current, I <sub>CC</sub> Max                                                  | I <sub>O</sub> = 0 | When V <sub>IS</sub> = V <sub>EE</sub> , V <sub>OS</sub> = V <sub>CC</sub>                                                                                                                                                                                                  | V <sub>CC</sub> or GND             | 0    | 5.5        | 25°C           |     |     | 12   | μA   |
|                                                                                                |                    |                                                                                                                                                                                                                                                                             |                                    |      |            | –55°C to 85°C  |     |     | 80   |      |
|                                                                                                |                    |                                                                                                                                                                                                                                                                             |                                    |      |            | –55°C to 125°C |     |     | 160  |      |
|                                                                                                |                    | When V <sub>IS</sub> = V <sub>CC</sub> , V <sub>OS</sub> = V <sub>EE</sub>                                                                                                                                                                                                  |                                    | -4.5 | 5.5        | 25°C           |     |     | 32   |      |
|                                                                                                |                    |                                                                                                                                                                                                                                                                             |                                    |      |            | –55°C to 85°C  |     |     | 160  |      |
|                                                                                                |                    |                                                                                                                                                                                                                                                                             |                                    |      |            | –55°C to 125°C |     |     | 320  |      |
| ΔI <sub>CC</sub> Additional quiescent device current per input pin: 1 unit load <sup>(2)</sup> |                    | ΔICC                                                                                                                                                                                                                                                                        | V <sub>CC</sub> - 2.1              |      | 4.5 to 5.5 | 25°C           |     | 100 | 360  | μA   |
|                                                                                                |                    |                                                                                                                                                                                                                                                                             |                                    |      |            | –55°C to 85°C  |     |     | 450  |      |
|                                                                                                |                    |                                                                                                                                                                                                                                                                             |                                    |      |            | –55°C to 125°C |     |     | 490  |      |

(1) Any voltage between  $V_{CC}$  and GND.

(2) For dual-supply systems, theoretical worse-case ( $V_I = 2.4V$ ,  $V_{CC} = 5.5V$ ) specification is 1.8mA.

## 5.7 Switching Characteristics, VCC = 5V

V<sub>CC</sub> = 5V, T<sub>A</sub> = 25°C, input t<sub>r</sub>, t<sub>f</sub> = 6 ns

| Parameter                                                    |                                                                        | Test Conditions          |             | C <sub>L</sub> (pF) | MIN | NOM | MAX | UNIT |
|--------------------------------------------------------------|------------------------------------------------------------------------|--------------------------|-------------|---------------------|-----|-----|-----|------|
| t <sub>PHL</sub> , t <sub>PLH</sub>                          | Supply voltage range (T <sub>A</sub> = full package temperature range) | Switch IN to OUT         | CDx4HC4051  | 15                  | 4   |     |     | ns   |
|                                                              |                                                                        |                          | CDx4HCT4051 |                     | 4   |     |     |      |
|                                                              |                                                                        |                          | CDx4HC4052  |                     | 4   |     |     |      |
|                                                              |                                                                        |                          | CDx4HCT4052 |                     | 4   |     |     |      |
|                                                              |                                                                        |                          | CDx4HC4053  |                     | 4   |     |     |      |
|                                                              |                                                                        |                          | CDx4HCT4053 |                     | 4   |     |     |      |
| t <sub>PHZ</sub> , t <sub>PLZ</sub>                          |                                                                        | Switch turn-off (S or E) | CDx4HC4051  | 15                  | 27  |     |     |      |
|                                                              |                                                                        |                          | CDx4HCT4051 |                     | 35  |     |     |      |
|                                                              |                                                                        |                          | CDx4HC4052  |                     | 33  |     |     |      |
|                                                              |                                                                        |                          | CDx4HCT4052 |                     | 33  |     |     |      |
|                                                              |                                                                        |                          | CDx4HC4053  |                     | 30  |     |     |      |
|                                                              |                                                                        |                          | CDx4HCT4053 |                     | 35  |     |     |      |
| t <sub>PZH</sub> , t <sub>PZL</sub>                          |                                                                        | Switch turn-on (S or E)  | CDx4HC4051  | 15                  | 19  |     |     |      |
|                                                              |                                                                        |                          | CDx4HCT4051 |                     | 23  |     |     |      |
|                                                              |                                                                        |                          | CDx4HC4052  |                     | 27  |     |     |      |
|                                                              |                                                                        |                          | CDx4HCT4052 |                     | 29  |     |     |      |
|                                                              |                                                                        |                          | CDx4HC4053  |                     | 18  |     |     |      |
|                                                              |                                                                        |                          | CDx4HCT4053 |                     | 28  |     |     |      |
| C <sub>PD</sub> Power dissipation capacitance <sup>(1)</sup> |                                                                        |                          | CDx4HC4051  |                     | 50  |     |     | pF   |
|                                                              |                                                                        |                          | CDx4HCT4051 |                     | 52  |     |     |      |
|                                                              |                                                                        |                          | CDx4HC4052  |                     | 74  |     |     |      |
|                                                              |                                                                        |                          | CDx4HCT4052 |                     | 76  |     |     |      |
|                                                              |                                                                        |                          | CDx4HC4053  |                     | 38  |     |     |      |
|                                                              |                                                                        |                          | CDx4HCT4053 |                     | 42  |     |     |      |

(1) C<sub>PD</sub> is used to determine the dynamic power consumption, per package.  $P_D = C_{PD} V_{CC}^2 f_i + \sum (C_L + C_S) V_{CC}^2 f_O$ . f<sub>O</sub> = output frequency, f<sub>i</sub> = input frequency, C<sub>L</sub> = output load capacitance, C<sub>S</sub> = switch capacitance, V<sub>CC</sub> = supply voltage

## 5.8 Switching Characteristics, CL = 50pF

CL = 50pF, input tr, tf = 6 ns

| Parameter                                                                      |      | VEE (V) | VCC (V) | Test Conditions      |         | MIN | NOM | MAX | UNIT |
|--------------------------------------------------------------------------------|------|---------|---------|----------------------|---------|-----|-----|-----|------|
| tPHL, tPLH<br>Propagation delay, switch in to out                              |      | 0       | 2       | TA = 25°C            | HC      |     |     | 60  | ns   |
|                                                                                |      |         |         | TA = -40°C to +85°C  | HC      |     |     | 75  |      |
|                                                                                |      |         |         | TA = -55°C to +125°C | HC      |     |     | 90  |      |
|                                                                                |      | 0       | 4.5     | TA = 25°C            | HC, HCT |     |     | 12  |      |
|                                                                                |      |         |         | TA = -40°C to +85°C  | HC, HCT |     |     | 15  |      |
|                                                                                |      |         |         | TA = -55°C to +125°C | HC, HCT |     |     | 18  |      |
|                                                                                |      | 0       | 6       | TA = 25°C            | HC      |     |     | 10  |      |
|                                                                                |      |         |         | TA = -40°C to +85°C  | HC      |     |     | 13  |      |
|                                                                                |      |         |         | TA = -55°C to +125°C | HC      |     |     | 15  |      |
|                                                                                |      | -4.5    | 4.5     | TA = 25°C            | HC, HCT |     |     | 8   |      |
|                                                                                |      |         |         | TA = -40°C to +85°C  | HC, HCT |     |     | 10  |      |
|                                                                                |      |         |         | TA = -55°C to +125°C | HC, HCT |     |     | 12  |      |
| tPHZ, tPLZ<br>Maximum switch turn OFF<br>delay from S or E to switch<br>output | 4051 | 0       | 2       | TA = 25°C            | HC      |     |     | 250 | ns   |
|                                                                                |      |         |         | TA = -40°C to +85°C  | HC      |     |     | 340 |      |
|                                                                                |      |         |         | TA = -55°C to +125°C | HC      |     |     | 400 |      |
|                                                                                |      | 0       | 4.5     | TA = 25°C            | HC, HCT |     |     | 50  |      |
|                                                                                |      |         |         | TA = -40°C to +85°C  | HC, HCT |     |     | 56  |      |
|                                                                                |      |         |         | TA = -55°C to +125°C | HC, HCT |     |     | 68  |      |
|                                                                                |      | 0       | 6       | TA = 25°C            | HC      |     |     | 44  |      |
|                                                                                |      |         |         | TA = -40°C to +85°C  | HC      |     |     | 50  |      |
|                                                                                |      |         |         | TA = -55°C to +125°C | HC      |     |     | 57  |      |
|                                                                                |      | -4.5    | 4.5     | TA = 25°C            | HC, HCT |     |     | 44  |      |
|                                                                                |      |         |         | TA = -40°C to +85°C  | HC, HCT |     |     | 50  |      |
|                                                                                |      |         |         | TA = -55°C to +125°C | HC, HCT |     |     | 55  |      |

## 5.8 Switching Characteristics, CL = 50pF (続き)

CL = 50pF, input tr, tr = 6 ns

| Parameter                                                                                               |      | V <sub>EE</sub> (V) | V <sub>CC</sub> (V) | Test Conditions                  |         | MIN | NOM | MAX | UNIT |
|---------------------------------------------------------------------------------------------------------|------|---------------------|---------------------|----------------------------------|---------|-----|-----|-----|------|
| t <sub>PHZ</sub> , t <sub>PLZ</sub><br>Maximum switch turn OFF<br>delay from S or E to switch<br>output | 4052 | 0                   | 2                   | T <sub>A</sub> = 25°C            | HC      |     |     | 250 | ns   |
|                                                                                                         |      |                     |                     | T <sub>A</sub> = -40°C to +85°C  | HC      |     |     | 340 |      |
|                                                                                                         |      |                     |                     | T <sub>A</sub> = -55°C to +125°C | HC      |     |     | 400 |      |
|                                                                                                         |      | 0                   | 4.5                 | T <sub>A</sub> = 25°C            | HC, HCT |     |     | 50  |      |
|                                                                                                         |      |                     |                     | T <sub>A</sub> = -40°C to +85°C  | HC, HCT |     |     | 63  |      |
|                                                                                                         |      |                     |                     | T <sub>A</sub> = -55°C to +125°C | HC, HCT |     |     | 75  |      |
|                                                                                                         |      | 0                   | 6                   | T <sub>A</sub> = 25°C            | HC      |     |     | 45  |      |
|                                                                                                         |      |                     |                     | T <sub>A</sub> = -40°C to +85°C  | HC      |     |     | 54  |      |
|                                                                                                         |      |                     |                     | T <sub>A</sub> = -55°C to +125°C | HC      |     |     | 65  |      |
|                                                                                                         |      | -4.5                | 4.5                 | T <sub>A</sub> = 25°C            | HC      |     |     | 45  |      |
|                                                                                                         |      |                     |                     |                                  | HCT     |     |     | 45  |      |
|                                                                                                         |      |                     |                     | T <sub>A</sub> = -40°C to +85°C  | HC      |     |     | 48  |      |
|                                                                                                         |      |                     |                     |                                  | HCT     |     |     | 50  |      |
|                                                                                                         |      |                     |                     | T <sub>A</sub> = -55°C to +125°C | HC      |     |     | 57  |      |
|                                                                                                         |      |                     |                     |                                  | HCT     |     |     | 57  |      |
| t <sub>PHZ</sub> , t <sub>PLZ</sub><br>Maximum switch turn OFF<br>delay from S or E to switch<br>output | 4053 | 0                   | 2                   | T <sub>A</sub> = 25°C            | HC      |     |     | 250 | ns   |
|                                                                                                         |      |                     |                     | T <sub>A</sub> = -40°C to +85°C  | HC      |     |     | 340 |      |
|                                                                                                         |      |                     |                     | T <sub>A</sub> = -55°C to +125°C | HC      |     |     | 400 |      |
|                                                                                                         |      | 0                   | 4.5                 | T <sub>A</sub> = 25°C            | HC      |     |     | 45  |      |
|                                                                                                         |      |                     |                     |                                  | HCT     |     |     | 50  |      |
|                                                                                                         |      |                     |                     | T <sub>A</sub> = -40°C to +85°C  | HC      |     |     | 53  |      |
|                                                                                                         |      |                     |                     |                                  | HCT     |     |     | 53  |      |
|                                                                                                         |      |                     |                     | T <sub>A</sub> = -55°C to +125°C | HC      |     |     | 63  |      |
|                                                                                                         |      |                     |                     |                                  | HCT     |     |     | 66  |      |
|                                                                                                         |      | 0                   | 6                   | T <sub>A</sub> = 25°C            | HC      |     |     | 45  |      |
|                                                                                                         |      |                     |                     | T <sub>A</sub> = -40°C to +85°C  | HC      |     |     | 50  |      |
|                                                                                                         |      |                     |                     | T <sub>A</sub> = -55°C to +125°C | HC      |     |     | 55  |      |
|                                                                                                         |      | -4.5                | 4.5                 | T <sub>A</sub> = 25°C            | HC      |     |     | 45  |      |
|                                                                                                         |      |                     |                     |                                  | HCT     |     |     | 45  |      |
|                                                                                                         |      |                     |                     | T <sub>A</sub> = -40°C to +85°C  | HC      |     |     | 50  |      |
|                                                                                                         |      |                     |                     |                                  | HCT     |     |     | 50  |      |
|                                                                                                         |      |                     |                     | T <sub>A</sub> = -55°C to +125°C | HC      |     |     | 55  |      |
|                                                                                                         |      |                     |                     |                                  | HCT     |     |     | 55  |      |

## 5.8 Switching Characteristics, CL = 50pF (続き)

CL = 50pF, input tr, tr = 6 ns

| Parameter                                                                                     |      | V <sub>EE</sub> (V) | V <sub>CC</sub> (V) | Test Conditions                  |     | MIN | NOM | MAX | UNIT |
|-----------------------------------------------------------------------------------------------|------|---------------------|---------------------|----------------------------------|-----|-----|-----|-----|------|
| t <sub>PZL</sub> , t <sub>PZH</sub> Maximum switch turn ON delay from S or E to switch output | 4051 | 0                   | 2                   | T <sub>A</sub> = 25°C            | HC  |     |     | 325 | ns   |
|                                                                                               |      |                     |                     | T <sub>A</sub> = -40°C to +85°C  | HC  |     |     | 405 |      |
|                                                                                               |      |                     |                     | T <sub>A</sub> = -55°C to +125°C | HC  |     |     | 490 |      |
|                                                                                               |      | 0                   | 4.5                 | T <sub>A</sub> = 25°C            | HC  |     |     | 45  |      |
|                                                                                               |      |                     |                     |                                  | HCT |     |     | 55  |      |
|                                                                                               |      |                     |                     | T <sub>A</sub> = -40°C to +85°C  | HC  |     |     | 56  |      |
|                                                                                               |      |                     |                     |                                  | HCT |     |     | 69  |      |
|                                                                                               |      |                     |                     | T <sub>A</sub> = -55°C to +125°C | HC  |     |     | 68  |      |
|                                                                                               |      |                     |                     |                                  | HCT |     |     | 83  |      |
|                                                                                               |      | 0                   | 6                   | T <sub>A</sub> = 25°C            | HC  |     |     | 38  |      |
|                                                                                               |      |                     |                     | T <sub>A</sub> = -40°C to +85°C  | HC  |     |     | 48  |      |
|                                                                                               |      |                     |                     | T <sub>A</sub> = -55°C to +125°C | HC  |     |     | 57  |      |
|                                                                                               |      | -4.5                | 4.5                 | T <sub>A</sub> = 25°C            | HC  |     |     | 36  |      |
|                                                                                               |      |                     |                     |                                  | HCT |     |     | 48  |      |
|                                                                                               |      |                     |                     | T <sub>A</sub> = -40°C to +85°C  | HC  |     |     | 40  |      |
|                                                                                               |      |                     |                     |                                  | HCT |     |     | 55  |      |
|                                                                                               |      |                     |                     | T <sub>A</sub> = -55°C to +125°C | HC  |     |     | 48  |      |
|                                                                                               |      |                     |                     |                                  | HCT |     |     | 60  |      |
| t <sub>PZL</sub> , t <sub>PZH</sub> Maximum switch turn ON delay from S or E to switch output | 4052 | 0                   | 2                   | T <sub>A</sub> = 25°C            | HC  |     |     | 325 | ns   |
|                                                                                               |      |                     |                     | T <sub>A</sub> = -40°C to +85°C  | HC  |     |     | 405 |      |
|                                                                                               |      |                     |                     | T <sub>A</sub> = -55°C to +125°C | HC  |     |     | 490 |      |
|                                                                                               |      | 0                   | 4.5                 | T <sub>A</sub> = 25°C            | HC  |     |     | 65  |      |
|                                                                                               |      |                     |                     |                                  | HCT |     |     | 70  |      |
|                                                                                               |      |                     |                     | T <sub>A</sub> = -40°C to +85°C  | HC  |     |     | 81  |      |
|                                                                                               |      |                     |                     |                                  | HCT |     |     | 68  |      |
|                                                                                               |      |                     |                     | T <sub>A</sub> = -55°C to +125°C | HC  |     |     | 98  |      |
|                                                                                               |      |                     |                     |                                  | HCT |     |     | 105 |      |
|                                                                                               |      | 0                   | 6                   | T <sub>A</sub> = 25°C            | HC  |     |     | 55  |      |
|                                                                                               |      |                     |                     | T <sub>A</sub> = -40°C to +85°C  | HC  |     |     | 69  |      |
|                                                                                               |      |                     |                     | T <sub>A</sub> = -55°C to +125°C | HC  |     |     | 83  |      |
|                                                                                               |      | -4.5                | 4.5                 | T <sub>A</sub> = 25°C            | HC  |     |     | 46  |      |
|                                                                                               |      |                     |                     |                                  | HCT |     |     | 48  |      |
|                                                                                               |      |                     |                     | T <sub>A</sub> = -40°C to +85°C  | HC  |     |     | 58  |      |
|                                                                                               |      |                     |                     |                                  | HCT |     |     | 60  |      |
|                                                                                               |      |                     |                     | T <sub>A</sub> = -55°C to +125°C | HC  |     |     | 69  |      |
|                                                                                               |      |                     |                     |                                  | HCT |     |     | 72  |      |

## 5.8 Switching Characteristics, CL = 50pF (続き)

CL = 50pF, input tr, tr = 6 ns

| Parameter                                                                                     |      | V <sub>EE</sub> (V) | V <sub>CC</sub> (V) | Test Conditions                  |         | MIN | NOM | MAX | UNIT |
|-----------------------------------------------------------------------------------------------|------|---------------------|---------------------|----------------------------------|---------|-----|-----|-----|------|
| t <sub>PZL</sub> , t <sub>PZH</sub> Maximum switch turn ON delay from S or E to switch output | 4053 | 0                   | 2                   | T <sub>A</sub> = 25°C            | HC      |     |     | 325 | ns   |
|                                                                                               |      |                     |                     | T <sub>A</sub> = –40°C to +85°C  | HC      |     |     | 405 |      |
|                                                                                               |      |                     |                     | T <sub>A</sub> = –55°C to +125°C | HC      |     |     | 490 |      |
|                                                                                               |      | 0                   | 4.5                 | T <sub>A</sub> = 25°C            | HC      |     |     | 44  |      |
|                                                                                               |      |                     |                     |                                  | HCT     |     |     | 48  |      |
|                                                                                               |      |                     |                     | T <sub>A</sub> = –40°C to +85°C  | HC      |     |     | 55  |      |
|                                                                                               |      |                     |                     |                                  | HCT     |     |     | 60  |      |
|                                                                                               |      |                     |                     | T <sub>A</sub> = –55°C to +125°C | HC      |     |     | 66  |      |
|                                                                                               |      |                     |                     |                                  | HCT     |     |     | 72  |      |
|                                                                                               |      | 0                   | 6                   | T <sub>A</sub> = 25°C            | HC      |     |     | 37  |      |
|                                                                                               |      |                     |                     | T <sub>A</sub> = –40°C to +85°C  | HC      |     |     | 47  |      |
|                                                                                               |      |                     |                     | T <sub>A</sub> = –55°C to +125°C | HC      |     |     | 56  |      |
|                                                                                               |      | –4.5                | 4.5                 | T <sub>A</sub> = 25°C            | HC      |     |     | 40  |      |
|                                                                                               |      |                     |                     |                                  | HCT     |     |     | 48  |      |
|                                                                                               |      |                     |                     | T <sub>A</sub> = –40°C to +85°C  | HC      |     |     | 45  |      |
|                                                                                               |      |                     |                     |                                  | HCT     |     |     | 55  |      |
|                                                                                               |      |                     |                     | T <sub>A</sub> = –55°C to +125°C | HC      |     |     | 47  |      |
|                                                                                               |      |                     |                     |                                  | HCT     |     |     | 60  |      |
| C <sub>I</sub> Input (control) capacitance                                                    |      |                     |                     | T <sub>A</sub> = 25°C            | HC, HCT |     |     | 10  | pF   |
|                                                                                               |      |                     |                     | T <sub>A</sub> = –40°C to +85°C  | HC, HCT |     |     | 10  |      |
|                                                                                               |      |                     |                     | T <sub>A</sub> = –55°C to +125°C | HC, HCT |     |     | 10  |      |

## 5.9 Analog Channel Specifications

Typical values at T<sub>A</sub> = 25°C

| Parameter                                                      | Test Conditions                            | HC, HCT TYPES | V <sub>EE</sub> (V) | V <sub>CC</sub> (V) | MIN | NOM | MAX | UNIT |
|----------------------------------------------------------------|--------------------------------------------|---------------|---------------------|---------------------|-----|-----|-----|------|
| C <sub>I</sub><br>Switch input capacitance                     |                                            | All           |                     |                     |     | 5   |     | pF   |
| C <sub>COM</sub><br>Common output capacitance                  |                                            | 4051          |                     |                     |     | 25  |     | pF   |
|                                                                |                                            | 4052          |                     |                     |     | 12  |     |      |
|                                                                |                                            | 4053          |                     |                     |     | 8   |     |      |
| f <sub>MAX</sub><br>Minimum switch frequency response at –3 dB | See note <sup>(1)</sup> and <sup>(2)</sup> | 4051          | –2.25               | 2.25                |     | 145 |     | MHz  |
|                                                                |                                            | 4052          | –2.25               | 2.25                |     | 165 |     |      |
|                                                                |                                            | 4053          | –2.25               | 2.25                |     | 200 |     |      |
|                                                                |                                            | 4051          | –4.5                | 4.5                 |     | 180 |     |      |
|                                                                |                                            | 4052          | –4.5                | 4.5                 |     | 185 |     |      |
|                                                                |                                            | 4053          | –4.5                | 4.5                 |     | 200 |     |      |

## 5.9 Analog Channel Specifications (続き)

Typical values at  $T_A = 25^\circ\text{C}$

| Parameter                     | Test Conditions                            | HC, HCT<br>TYPES | $V_{EE}$ (V) | $V_{CC}$ (V) | MIN NOM MAX | UNIT |
|-------------------------------|--------------------------------------------|------------------|--------------|--------------|-------------|------|
| THD<br>Sine-wave distortion   |                                            | All              | -2.25        | 2.25         | 0.03<br>5   | %    |
|                               |                                            | All              | -4.5         | 4.5          | 0.01<br>8   |      |
| Switch OFF signal feedthrough | See note <sup>(2)</sup> and <sup>(3)</sup> | 4051             | -2.25        | 2.25         | -73         | dB   |
|                               |                                            | 4052             | -2.25        | 2.25         | -65         |      |
|                               |                                            | 4053             | -2.25        | 2.25         | -64         |      |
|                               |                                            | 4051             | -4.5         | 4.5          | -75         |      |
|                               |                                            | 4052             | -4.5         | 4.5          | -67         |      |
|                               |                                            | 4053             | -4.5         | 4.5          | -66         |      |

- (1) Adjust input voltage to obtain 0 dBm at  $V_{OS}$  for  $f_{IN} = 1$  MHz.  
(2)  $V_{is}$  is centered at  $(V_{CC} - V_{EE}) / 2$ .  
(3) Adjust input for 0 dBm.

## 5.10 Typical Characteristics

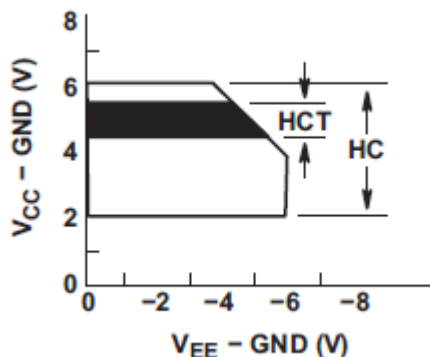


図 5-1. Recommended Operating Area as a Function of ( $V_{CC} - V_{EE}$ )

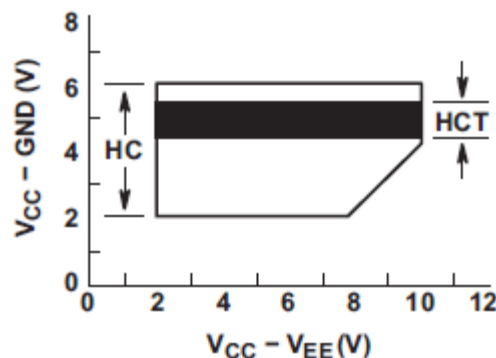


図 5-2. Recommended Operating Area as a Function of ( $V_{CC} - GND$ )

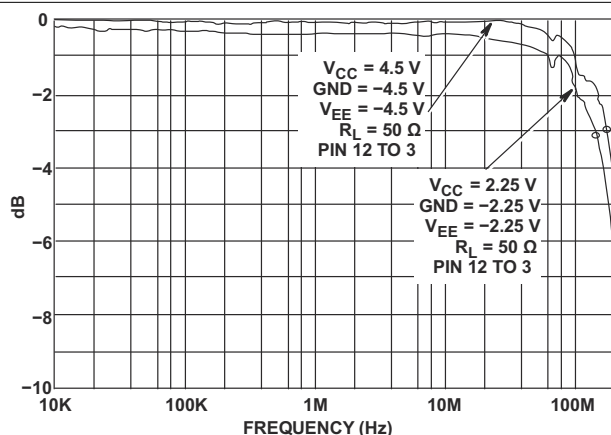


図 5-3. Channel ON Bandwidth (HC and HCT4051)

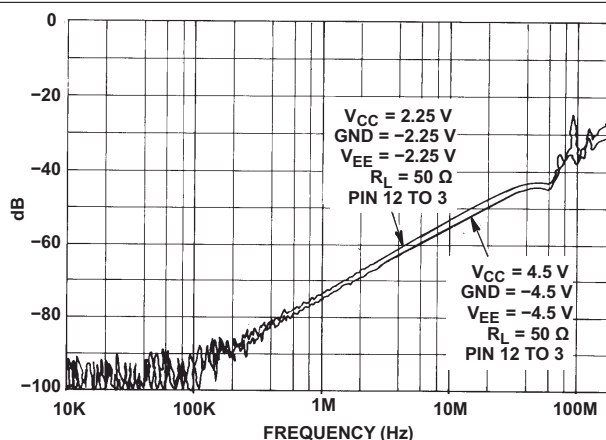


図 5-4. Channel OFF Feedthrough (HC and HCT4051)

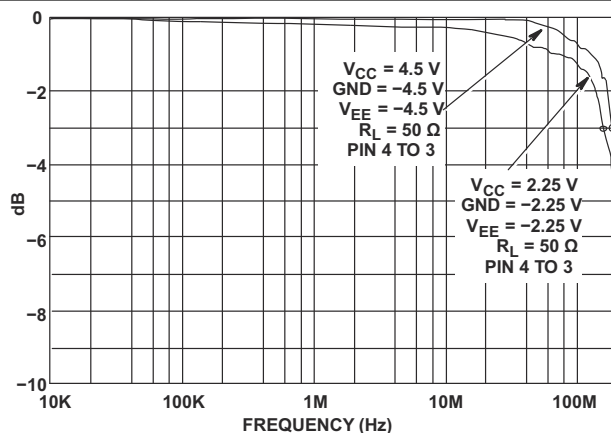


図 5-5. Channel ON Bandwidth (HC and HCT4052)

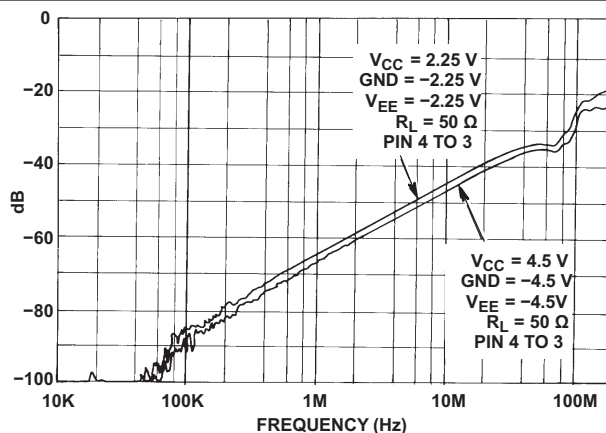
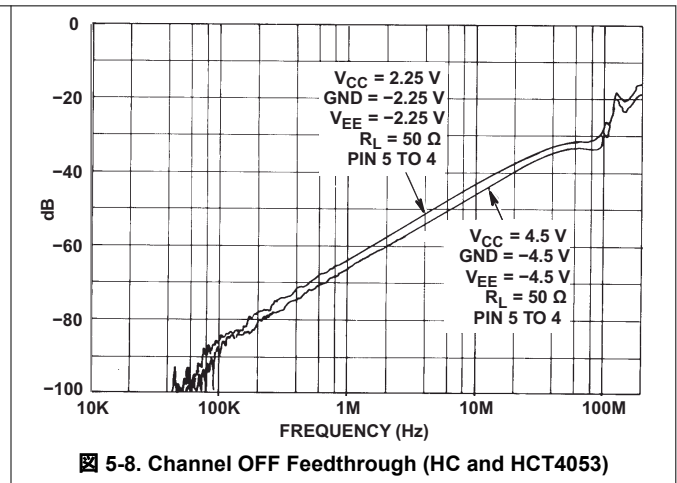
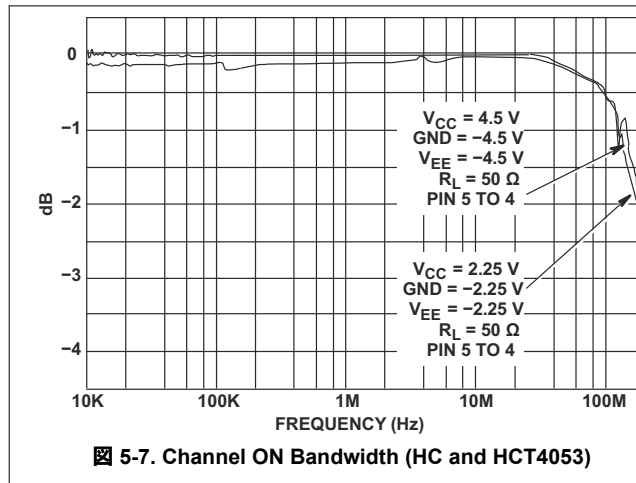
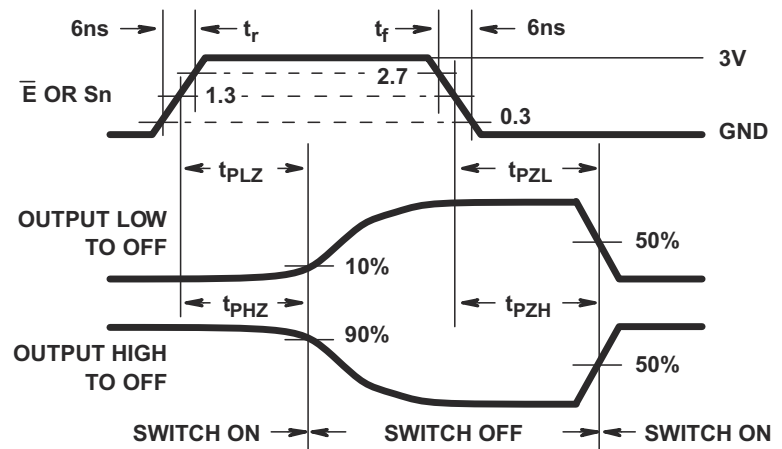
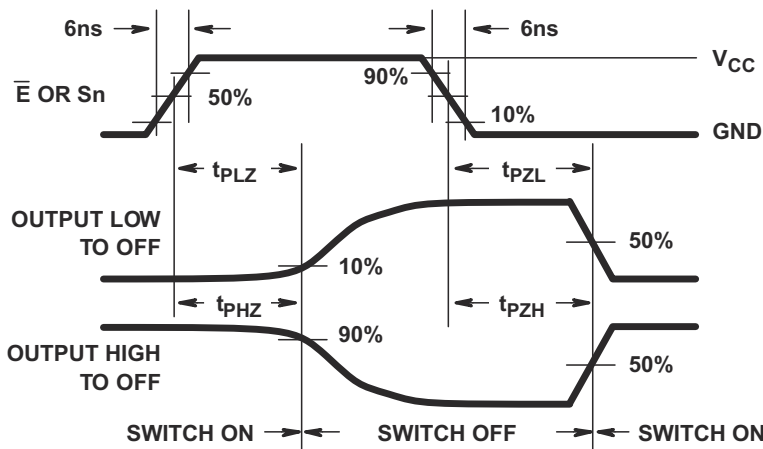
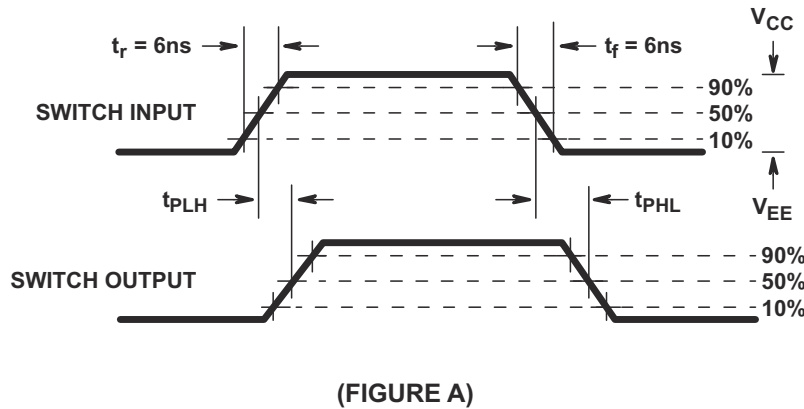


図 5-6. Channel OFF Feedthrough (HC and HCT4052)

## 5.10 Typical Characteristics (continued)



## 6 Parameter Measurement Information



**FIG 6-1. Switch Propagation Delay, Turn-On, Turn-Off Times**

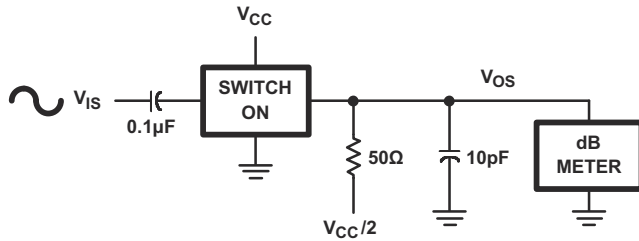


図 6-2. Frequency Response Test Circuit

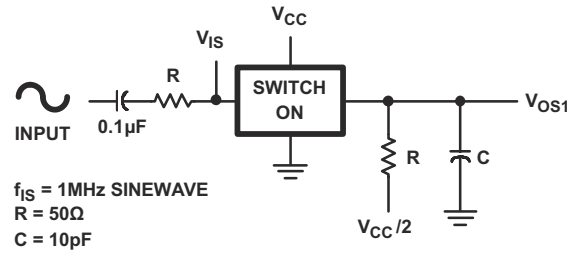


図 6-3. Crosstalk Between Two Switches Test Circuit

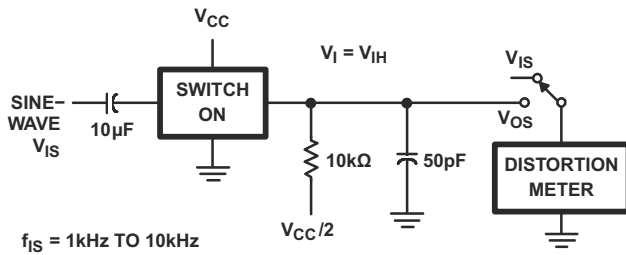


図 6-4. 1/4 Sine-Wave Distortion Test Circuit

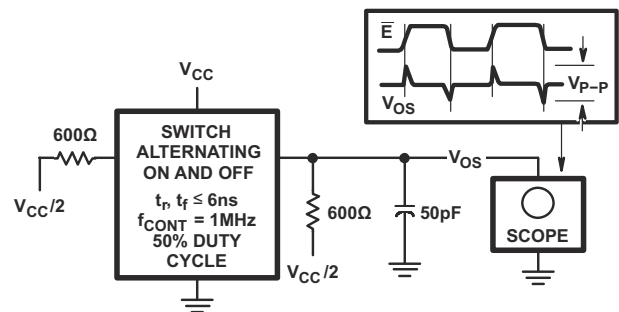


図 6-5. Control to Switch Feedthrough Noise Test Circuit

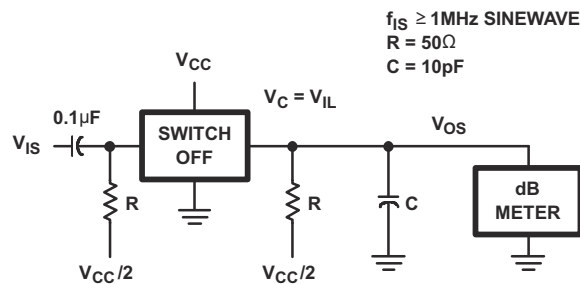


図 6-6. Switch OFF Signal Feedthrough

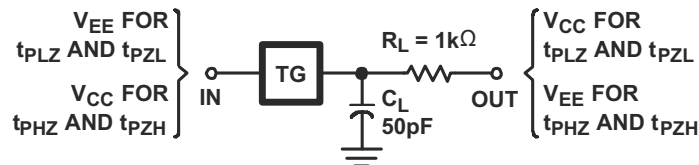


図 6-7. Switch ON/OFF Propagation Delay Test Circuit

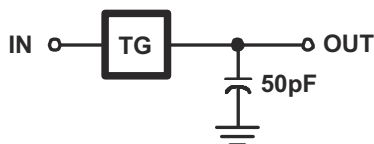


図 6-8. Switch In to Switch Out Propagation Delay Test Circuit

## 7 Detailed Description

### 7.1 Overview

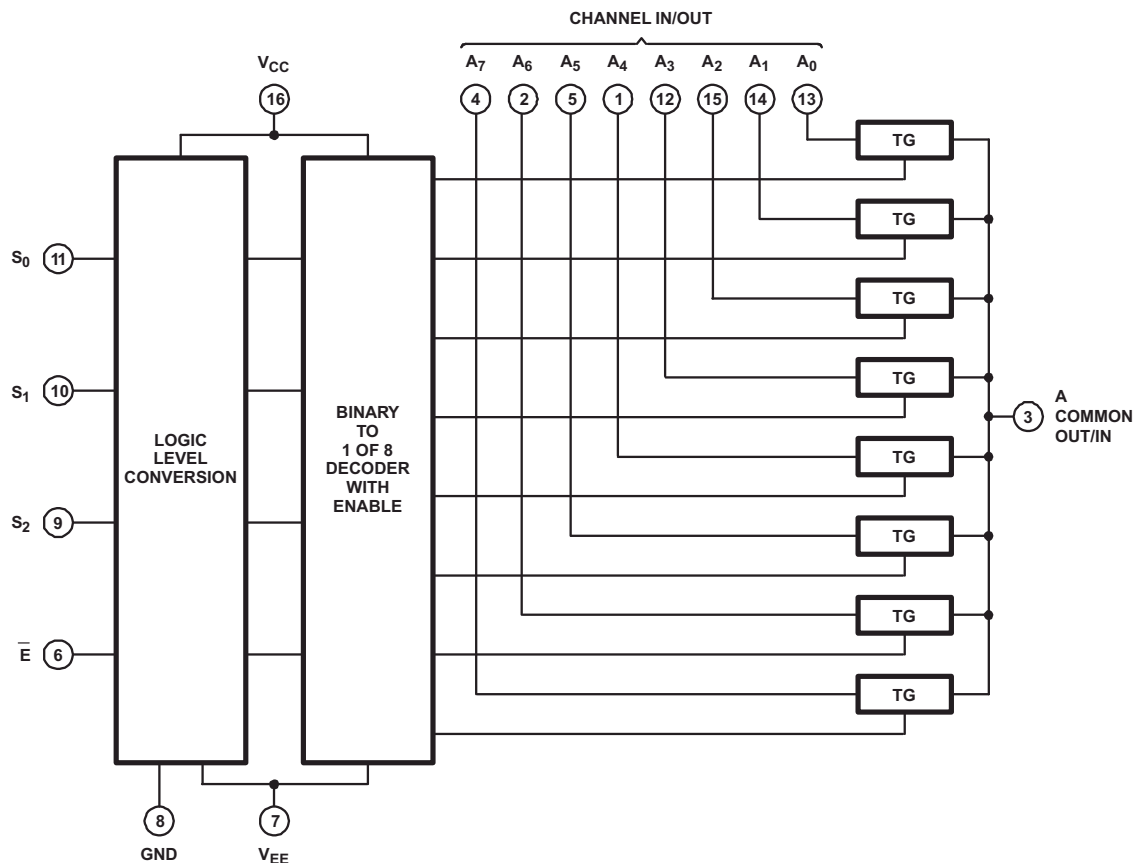
The CDx4HCx4051 devices are a single 8-channel multiplexer having three binary control inputs,  $S_0$ ,  $S_1$ , and  $S_2$  and an  $\overline{\text{ENABLE}}$  input. The three binary signals select 1 of 8 channels to be turned on, and connect one of the 8 inputs to the output.

The CDx4HCx4052 devices are a differential 4-channel multiplexer having two binary control inputs,  $S_0$  and  $S_1$ , and an  $\overline{\text{ENABLE}}$  input. The two binary input signals select 1 of 4 pairs of channels to be turned on and connect the analog inputs to the outputs.

The CDx4HCx4053 devices are a triple 2-channel multiplexer having three separate digital control inputs,  $S_0$ ,  $S_1$ , and  $S_2$  and an  $\overline{\text{ENABLE}}$  input. Each control input selects one of a pair of channels that are connected in a single-pole, double-throw configuration.

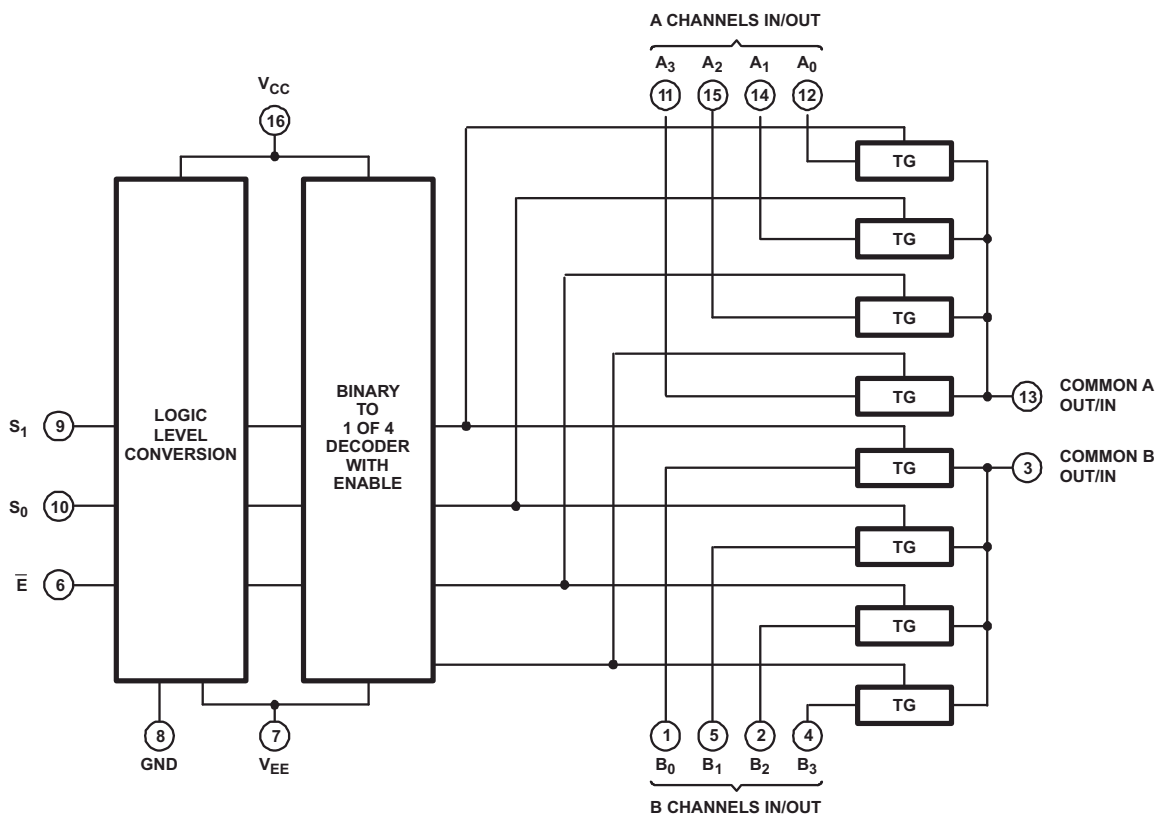
When these devices are used as demultiplexers, the CHANNEL IN/OUT terminals are the outputs and the COMMON OUT/IN terminals are the inputs.

### 7.2 Functional Block Diagrams



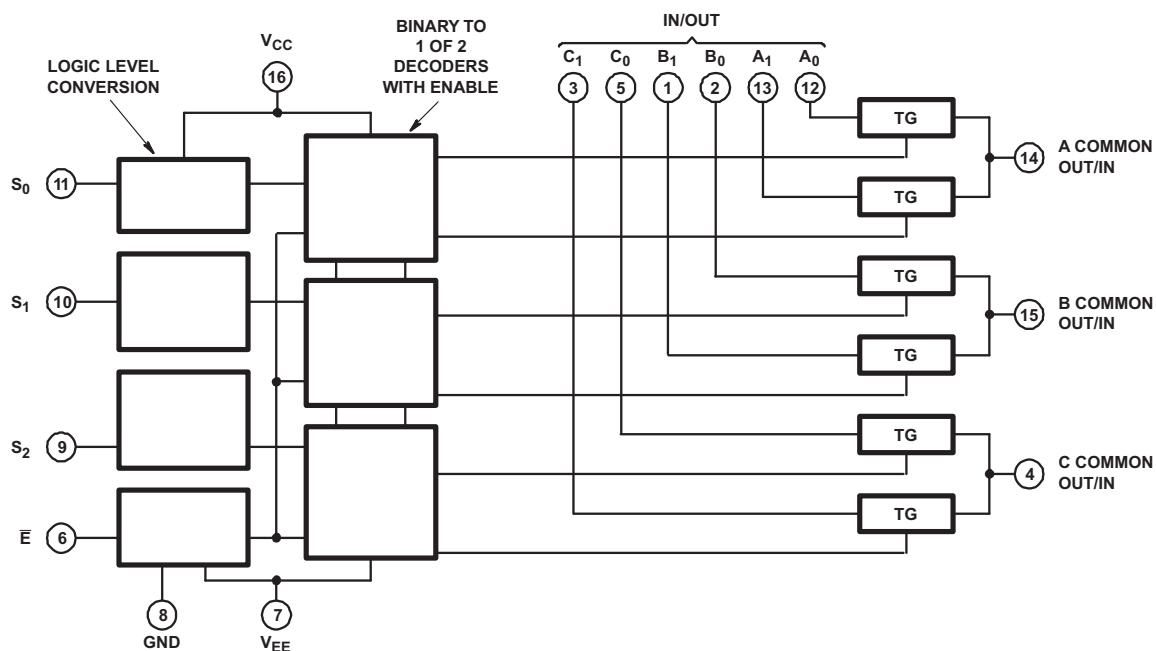
All inputs are protected by standard CMOS protection network.

**7-1. CDx4HCx4051 Functional Block Diagram**



All inputs are protected by standard CMOS protection network.

**7-2. CDx4HCx4052 Functional Block Diagram**



All inputs are protected by standard CMOS protection network.

**7-3. CDx4HCx4053 Functional Block Diagram**

## 7.3 Feature Description

The CDx4HCx405x line of multiplexers and demultiplexers can accept a wide range of analog signal levels from –5 to +5V. They have low ON resistance, typically 70Ω for  $V_{CC} - V_{EE} = 4.5V$  and 40Ω for  $V_C - V_{EE} = 4.5V$ , which allows for very little signal loss through the switch.

Binary address decoding on chip makes channel selection easy. When channels are changed, a break-before-make system eliminates channel overlap.

## 7.4 Device Functional Modes

表 7-1. CD54HC4051, CD74HC4051, CD54HCT4051, CD74HCT4051 Function Table<sup>(1)</sup>

| INPUT STATES |                |                |                | ON CHANNEL |
|--------------|----------------|----------------|----------------|------------|
| ENABLE       | S <sub>2</sub> | S <sub>1</sub> | S <sub>0</sub> |            |
| L            | L              | L              | L              | A0         |
| L            | L              | L              | H              | A1         |
| L            | L              | H              | L              | A2         |
| L            | L              | H              | H              | A3         |
| L            | H              | L              | L              | A4         |
| L            | H              | L              | H              | A5         |
| L            | H              | H              | L              | A6         |
| L            | H              | H              | H              | A7         |
| H            | X              | X              | X              | None       |

(1) X = Don't care

表 7-2. CD54HC4052, CD74HC4052, CD54HCT4052, CD74HCT4052 Function Table<sup>(1)</sup>

| INPUT STATES |                |                | ON CHANNELS |
|--------------|----------------|----------------|-------------|
| ENABLE       | S <sub>1</sub> | S <sub>0</sub> |             |
| L            | L              | L              | A0, B0      |
| L            | L              | H              | A1, B1      |
| L            | H              | L              | A2, B2      |
| L            | H              | H              | A3, B3      |
| H            | X              | X              | None        |

(1) X = Don't care

表 7-3. CD54HC4053, CD74HC4053, CD54HCT4053, CD74HCT4053 Function Table<sup>(1)</sup>

| INPUT STATES |                |                |                | ON CHANNELS |
|--------------|----------------|----------------|----------------|-------------|
| ENABLE       | S <sub>2</sub> | S <sub>1</sub> | S <sub>0</sub> |             |
| L            | L              | L              | L              | C0, B0, A0  |
| L            | L              | L              | H              | C0, B0, A1  |
| L            | L              | H              | L              | C0, B1, A0  |
| L            | L              | H              | H              | C0, B1, A1  |
| L            | H              | L              | L              | C1, B0, A0  |
| L            | H              | L              | H              | C1, B0, A1  |
| L            | H              | H              | L              | C1, B1, A0  |
| L            | H              | H              | H              | C1, B1, A1  |
| H            | X              | X              | X              | None        |

(1) X = Don't care

## 8 Application and Implementation

### 注

以下のアプリケーション情報は、TI の製品仕様に含まれるものではなく、TI ではその正確性または完全性を保証いたしません。個々の目的に対する製品の適合性については、お客様の責任で判断していただくことになります。お客様は自身の設計実装を検証しテストすることで、システムの機能を確認する必要があります。

### 8.1 Application Information

The CDx4HCx405x line of multiplexers and demultiplexers can be used for a wide variety of applications.

### 8.2 Typical Application

One application of the CD74HC4051 device is used in conjunction with a microcontroller to poll a keypad. 図 8-1 shows the basic schematic for such a polling system. The microcontroller uses the channel-select pins to cycle through the different channels while reading the input to see if a user is pressing any of the keys. This is a very robust setup that allows for simultaneous key presses with very little power consumption. It also uses very few pins on the microcontroller. The down side of polling is that the microcontroller must frequently scan the keys for a press.

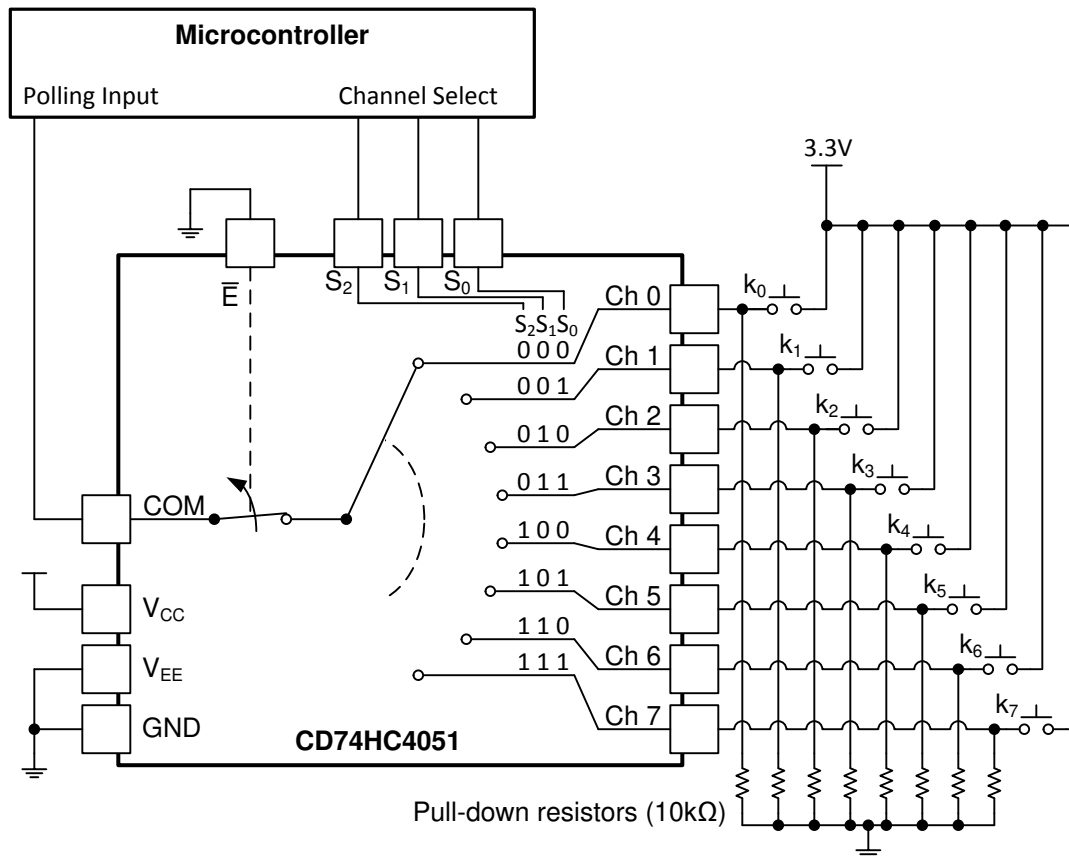


図 8-1. CD74HC4051 Being Used to Help Read Button Presses on a Keypad

#### 8.2.1 Design Requirements

These devices use CMOS technology and have balanced output drive. Take care to avoid bus contention because it can drive currents that would exceed maximum limits. The high drive will also create fast edges into light loads, so routing and load conditions must be considered to prevent ringing.

See 表 8-1 for the input loading details.

表 8-1. HCT Input Loading Table

| TYPE       | INPUT | UNIT LOADS <sup>(1)</sup> |
|------------|-------|---------------------------|
| 4051, 4053 | All   | 0.5                       |
| 4052       | All   | 0.4                       |

(1) Unit load is  $\Delta I_{CC}$  limit specified in セクション 5, for example, 360mA MAX at 25°C.

## 8.2.2 Detailed Design Procedure

- Recommended input conditions:
  - For switch time specifications, see propagation delay times in セクション 5.5.
  - Inputs must not be pushed more than 0.5V above  $V_{DD}$  or below  $V_{EE}$ .
  - For input voltage level specifications for control inputs, see  $V_{IH}$  and  $V_{IL}$  in セクション 5.5.
- Recommended output conditions:
  - Outputs must not be pulled above  $V_{DD}$  or below  $V_{EE}$ .
- Input and output current consideration:
  - The CDx4HCx405x series of parts do not have internal current-drive circuitry, and thus cannot sink or source current. Any current will be passed through the device.

## 8.2.3 Application Curve

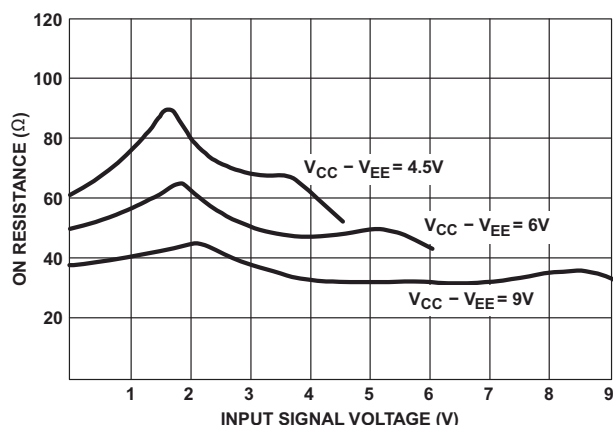


図 8-2. Typical ON Resistance vs Input Signal Voltage

## 8.3 Power Supply Recommendations

The power supply can be any voltage between the minimum and maximum supply voltage rating located in the セクション 5.5.

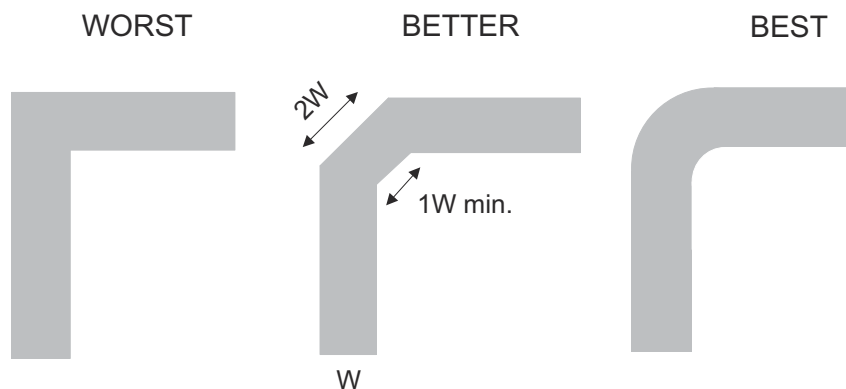
Each  $V_{CC}$  terminal must have a good bypass capacitor to prevent power disturbance. For devices with a single supply, a 0.1μF bypass capacitor is recommended. If there are multiple pins labeled  $V_{CC}$ , then a 0.01μF or 0.022μF capacitor is recommended for each  $V_{CC}$  because the  $V_{CC}$  pins will be tied together internally. For devices with dual-supply pins operating at different voltages, for example  $V_{CC}$  and  $V_{DD}$ , a 0.1μF bypass capacitor is recommended for each supply pin. It is acceptable to parallel multiple bypass capacitors to reject different frequencies of noise. A 0.1μF and a 1μF capacitor are commonly used in parallel. For best results, the bypass capacitor or capacitors must be installed as close as possible to the power terminal.

## 8.4 Layout

### 8.4.1 Layout Guidelines

Reflections and matching are closely related to loop antenna theory, but different enough to warrant their own discussion. When a PCB trace turns a corner at a 90° angle, a reflection can occur. This is primarily due to the change in width of the trace. At the apex of the turn, the trace width is increased to 1.414 times its width. This change in width upsets the transmission line characteristics, especially the distributed capacitance and self-inductance of the trace, thus resulting in the reflection. Not all PCB traces can be straight, so they will have to turn corners. [Figure 8-3](#) shows progressively better techniques of rounding corners. Only the last example (BEST) maintains constant trace width and minimizes reflections.

### 8.4.2 Layout Example



**Figure 8-3. Trace Example**

## 9 Device and Documentation Support

### 9.1 Documentation Support

#### 9.1.1 Related Documentation

For related documentation, see the following:

- Texas Instruments, [Implications of Slow or Floating CMOS Inputs](#)

### 9.2 ドキュメントの更新通知を受け取る方法

ドキュメントの更新についての通知を受け取るには、[www.tij.co.jp](http://www.tij.co.jp) のデバイス製品フォルダを開いてください。[通知] をクリックして登録すると、変更されたすべての製品情報に関するダイジェストを毎週受け取ることができます。変更の詳細については、改訂されたドキュメントに含まれている改訂履歴をご覧ください。

### 9.3 サポート・リソース

テキサス・インスツルメンツ E2E™ サポート・フォーラムは、エンジニアが検証済みの回答と設計に関するヒントをエキスパートから迅速かつ直接得ることができる場所です。既存の回答を検索したり、独自の質問をしたりすることで、設計に必要な支援を迅速に得ることができます。

リンクされているコンテンツは、各寄稿者により「現状のまま」提供されるものです。これらはテキサス・インスツルメンツの仕様を構成するものではなく、必ずしもテキサス・インスツルメンツの見解を反映したものではありません。テキサス・インスツルメンツの[使用条件](#)を参照してください。

### 9.4 Trademarks

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すべての商標は、それぞれの所有者に帰属します。

### 9.5 静電気放電に関する注意事項



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ESD による破損は、わずかな性能低下からデバイスの完全な故障まで多岐にわたります。精密な IC の場合、パラメータがわずかに変化するだけで公表されている仕様から外れる可能性があるため、破損が発生しやすくなっています。

### 9.6 用語集

[テキサス・インスツルメンツ用語集](#) この用語集には、用語や略語の一覧および定義が記載されています。

## 10 Revision History

資料番号末尾の英字は改訂を表しています。その改訂履歴は英語版に準じています。

| Changes from Revision M (May 2019) to Revision N (April 2024)                                          | Page |
|--------------------------------------------------------------------------------------------------------|------|
| • Changed thermal metrics.....                                                                         | 8    |
| • Changed HC ICC at 25°C single/dual supply.....                                                       | 9    |
| • Changed HCT ICC at 25°C single/dual supply.....                                                      | 12   |
| • Changed tPHZ/tPLZ typicals Switch turn-off (S or E).....                                             | 14   |
| • Changed tPHZ/tPLZ maximum switch turn OFF delay from S or E to switch output for 4051/4052/4053..... | 15   |
| • Changed tPZL/tPZH maximum switch turn ON delay from S or E to switch output for 4051/4053.....       | 15   |

| Changes from Revision L (February 2017) to Revision M (May 2019) | Page |
|------------------------------------------------------------------|------|
| • 「特長」の 標準値 7Ω を標準値 70Ω に変更.....                                 | 1    |

| Changes from Revision K (September 2015) to Revision L (February 2017)            | Page |
|-----------------------------------------------------------------------------------|------|
| • Changed charged device model (CDM) value from: $\pm 1000V$ to: $\pm 200V$ ..... | 7    |
| • Added <i>Receiving Notification of Documentation Updates</i> section .....      | 7    |

| Changes from Revision J (February 2011) to Revision K (September 2015)                                                                                               | Page |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| • 「特長」のリストに軍事利用についての免責事項を追加 .....                                                                                                                                    | 1    |
| • 「注文情報」表を削除 .....                                                                                                                                                   | 1    |
| • 「製品情報」表、「ピン端子機能」表、「ESD 定格」表、「熱に関する情報」表、「詳細説明」セクション、「アプリケーションと実装」セクション、「電源に関する推奨事項」セクション、「レイアウト」セクション、「デバイスおよびドキュメントのサポート」セクション、「メカニカル、パッケージ、および注文情報」セクションを追加 ..... | 1    |

## 11 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.

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## PACKAGING INFORMATION

| Orderable Device | Status<br>(1) | Package Type | Package<br>Drawing | Pins | Package<br>Qty | Eco Plan<br>(2)     | Lead finish/<br>Ball material<br>(6) | MSL Peak Temp<br>(3) | Op Temp (°C) | Device Marking<br>(4/5)               | Samples                 |
|------------------|---------------|--------------|--------------------|------|----------------|---------------------|--------------------------------------|----------------------|--------------|---------------------------------------|-------------------------|
| 5962-8775401EA   | ACTIVE        | CDIP         | J                  | 16   | 25             | Non-RoHS<br>& Green | SNPB                                 | N / A for Pkg Type   | -55 to 125   | 5962-8775401EA<br>CD54HC4053F3A       | <a href="#">Samples</a> |
| 5962-8855601EA   | ACTIVE        | CDIP         | J                  | 16   | 25             | Non-RoHS<br>& Green | SNPB                                 | N / A for Pkg Type   | -55 to 125   | 5962-8855601EA<br>CD54HC4052F3A       | <a href="#">Samples</a> |
| 5962-9065401MEA  | ACTIVE        | CDIP         | J                  | 16   | 25             | Non-RoHS<br>& Green | SNPB                                 | N / A for Pkg Type   | -55 to 125   | 5962-9065401ME<br>A<br>CD54HCT4051F3A | <a href="#">Samples</a> |
| CD54HC4051F      | ACTIVE        | CDIP         | J                  | 16   | 25             | Non-RoHS<br>& Green | SNPB                                 | N / A for Pkg Type   | -55 to 125   | CD54HC4051F                           | <a href="#">Samples</a> |
| CD54HC4051F3A    | ACTIVE        | CDIP         | J                  | 16   | 25             | Non-RoHS<br>& Green | SNPB                                 | N / A for Pkg Type   | -55 to 125   | CD54HC4051F3A                         | <a href="#">Samples</a> |
| CD54HC4052F      | ACTIVE        | CDIP         | J                  | 16   | 25             | Non-RoHS<br>& Green | SNPB                                 | N / A for Pkg Type   | -55 to 125   | CD54HC4052F                           | <a href="#">Samples</a> |
| CD54HC4052F3A    | ACTIVE        | CDIP         | J                  | 16   | 25             | Non-RoHS<br>& Green | SNPB                                 | N / A for Pkg Type   | -55 to 125   | 5962-8855601EA<br>CD54HC4052F3A       | <a href="#">Samples</a> |
| CD54HC4053F      | ACTIVE        | CDIP         | J                  | 16   | 25             | Non-RoHS<br>& Green | SNPB                                 | N / A for Pkg Type   | -55 to 125   | CD54HC4053F                           | <a href="#">Samples</a> |
| CD54HC4053F3A    | ACTIVE        | CDIP         | J                  | 16   | 25             | Non-RoHS<br>& Green | SNPB                                 | N / A for Pkg Type   | -55 to 125   | 5962-8775401EA<br>CD54HC4053F3A       | <a href="#">Samples</a> |
| CD54HCT4051F3A   | ACTIVE        | CDIP         | J                  | 16   | 25             | Non-RoHS<br>& Green | SNPB                                 | N / A for Pkg Type   | -55 to 125   | 5962-9065401ME<br>A<br>CD54HCT4051F3A | <a href="#">Samples</a> |
| CD74HC4051E      | ACTIVE        | PDIP         | N                  | 16   | 25             | RoHS & Green        | NIPDAU                               | N / A for Pkg Type   | -55 to 125   | CD74HC4051E                           | <a href="#">Samples</a> |
| CD74HC4051EE4    | ACTIVE        | PDIP         | N                  | 16   | 25             | RoHS & Green        | NIPDAU                               | N / A for Pkg Type   | -55 to 125   | CD74HC4051E                           | <a href="#">Samples</a> |
| CD74HC4051M      | LIFEBUY       | SOIC         | D                  | 16   | 40             | RoHS & Green        | NIPDAU                               | Level-1-260C-UNLIM   | -55 to 125   | HC4051M                               |                         |
| CD74HC4051M96    | ACTIVE        | SOIC         | D                  | 16   | 2500           | RoHS & Green        | NIPDAU   SN                          | Level-1-260C-UNLIM   | -55 to 125   | HC4051M                               | <a href="#">Samples</a> |
| CD74HC4051M96E4  | LIFEBUY       | SOIC         | D                  | 16   | 2500           | RoHS & Green        | NIPDAU                               | Level-1-260C-UNLIM   | -55 to 125   | HC4051M                               |                         |
| CD74HC4051M96G3  | LIFEBUY       | SOIC         | D                  | 16   | 2500           | RoHS & Green        | SN                                   | Level-1-260C-UNLIM   | -55 to 125   | HC4051M                               |                         |
| CD74HC4051M96G4  | LIFEBUY       | SOIC         | D                  | 16   | 2500           | RoHS & Green        | NIPDAU                               | Level-1-260C-UNLIM   | -55 to 125   | HC4051M                               |                         |
| CD74HC4051ME4    | LIFEBUY       | SOIC         | D                  | 16   | 40             | RoHS & Green        | NIPDAU                               | Level-1-260C-UNLIM   | -55 to 125   | HC4051M                               |                         |
| CD74HC4051MT     | LIFEBUY       | SOIC         | D                  | 16   | 250            | RoHS & Green        | NIPDAU                               | Level-1-260C-UNLIM   | -55 to 125   | HC4051M                               |                         |

| Orderable Device | Status<br>(1) | Package Type | Package<br>Drawing | Pins | Package<br>Qty | Eco Plan<br>(2) | Lead finish/<br>Ball material<br>(6) | MSL Peak Temp<br>(3) | Op Temp (°C) | Device Marking<br>(4/5) | Samples                 |
|------------------|---------------|--------------|--------------------|------|----------------|-----------------|--------------------------------------|----------------------|--------------|-------------------------|-------------------------|
| CD74HC4051NS     | LIFEBUY       | SO           | NS                 | 16   | 50             | RoHS & Green    | NIPDAU                               | Level-1-260C-UNLIM   |              | HC4051M                 |                         |
| CD74HC4051NSR    | ACTIVE        | SO           | NS                 | 16   | 2000           | RoHS & Green    | NIPDAU                               | Level-1-260C-UNLIM   | -55 to 125   | HC4051M                 | <a href="#">Samples</a> |
| CD74HC4051NSRE4  | ACTIVE        | SO           | NS                 | 16   | 2000           | RoHS & Green    | NIPDAU                               | Level-1-260C-UNLIM   | -55 to 125   | HC4051M                 | <a href="#">Samples</a> |
| CD74HC4051PWR    | ACTIVE        | TSSOP        | PW                 | 16   | 2000           | RoHS & Green    | NIPDAU   SN                          | Level-1-260C-UNLIM   | -55 to 125   | HJ4051                  | <a href="#">Samples</a> |
| CD74HC4051PWRG4  | LIFEBUY       | TSSOP        | PW                 | 16   | 2000           | RoHS & Green    | NIPDAU                               | Level-1-260C-UNLIM   | -55 to 125   | HJ4051                  |                         |
| CD74HC4051PWT    | LIFEBUY       | TSSOP        | PW                 | 16   | 250            | RoHS & Green    | NIPDAU                               | Level-1-260C-UNLIM   | -55 to 125   | HJ4051                  |                         |
| CD74HC4051PWTG4  | LIFEBUY       | TSSOP        | PW                 | 16   | 250            | RoHS & Green    | NIPDAU                               | Level-1-260C-UNLIM   | -55 to 125   | HJ4051                  |                         |
| CD74HC4052E      | ACTIVE        | PDIP         | N                  | 16   | 25             | RoHS & Green    | NIPDAU                               | N / A for Pkg Type   | -55 to 125   | CD74HC4052E             | <a href="#">Samples</a> |
| CD74HC4052M      | LIFEBUY       | SOIC         | D                  | 16   | 40             | RoHS & Green    | NIPDAU                               | Level-1-260C-UNLIM   | -55 to 125   | HC4052M                 |                         |
| CD74HC4052M96    | ACTIVE        | SOIC         | D                  | 16   | 2500           | RoHS & Green    | NIPDAU   SN                          | Level-1-260C-UNLIM   | -55 to 125   | HC4052M                 | <a href="#">Samples</a> |
| CD74HC4052M96E4  | LIFEBUY       | SOIC         | D                  | 16   | 2500           | RoHS & Green    | NIPDAU                               | Level-1-260C-UNLIM   | -55 to 125   | HC4052M                 |                         |
| CD74HC4052M96G4  | LIFEBUY       | SOIC         | D                  | 16   | 2500           | RoHS & Green    | NIPDAU                               | Level-1-260C-UNLIM   | -55 to 125   | HC4052M                 |                         |
| CD74HC4052MT     | LIFEBUY       | SOIC         | D                  | 16   | 250            | RoHS & Green    | NIPDAU                               | Level-1-260C-UNLIM   | -55 to 125   | HC4052M                 |                         |
| CD74HC4052NSR    | ACTIVE        | SO           | NS                 | 16   | 2000           | RoHS & Green    | NIPDAU                               | Level-1-260C-UNLIM   | -55 to 125   | HC4052M                 | <a href="#">Samples</a> |
| CD74HC4052PW     | LIFEBUY       | TSSOP        | PW                 | 16   | 90             | RoHS & Green    | NIPDAU                               | Level-1-260C-UNLIM   | -55 to 125   | HJ4052                  |                         |
| CD74HC4052PWR    | ACTIVE        | TSSOP        | PW                 | 16   | 2000           | RoHS & Green    | NIPDAU   SN                          | Level-1-260C-UNLIM   | -55 to 125   | HJ4052                  | <a href="#">Samples</a> |
| CD74HC4052PWRG4  | LIFEBUY       | TSSOP        | PW                 | 16   | 2000           | RoHS & Green    | NIPDAU                               | Level-1-260C-UNLIM   | -55 to 125   | HJ4052                  |                         |
| CD74HC4052PWT    | LIFEBUY       | TSSOP        | PW                 | 16   | 250            | RoHS & Green    | NIPDAU                               | Level-1-260C-UNLIM   | -55 to 125   | HJ4052                  |                         |
| CD74HC4053E      | ACTIVE        | PDIP         | N                  | 16   | 25             | RoHS & Green    | NIPDAU                               | N / A for Pkg Type   | -55 to 125   | CD74HC4053E             | <a href="#">Samples</a> |
| CD74HC4053M      | LIFEBUY       | SOIC         | D                  | 16   | 40             | RoHS & Green    | NIPDAU                               | Level-1-260C-UNLIM   | -55 to 125   | HC4053M                 |                         |
| CD74HC4053M96    | ACTIVE        | SOIC         | D                  | 16   | 2500           | RoHS & Green    | NIPDAU   SN                          | Level-1-260C-UNLIM   | -55 to 125   | HC4053M                 | <a href="#">Samples</a> |
| CD74HC4053M96G3  | LIFEBUY       | SOIC         | D                  | 16   | 2500           | RoHS & Green    | SN                                   | Level-1-260C-UNLIM   | -55 to 125   | HC4053M                 |                         |
| CD74HC4053M96G4  | LIFEBUY       | SOIC         | D                  | 16   | 2500           | RoHS & Green    | NIPDAU                               | Level-1-260C-UNLIM   | -55 to 125   | HC4053M                 |                         |
| CD74HC4053ME4    | LIFEBUY       | SOIC         | D                  | 16   | 40             | RoHS & Green    | NIPDAU                               | Level-1-260C-UNLIM   | -55 to 125   | HC4053M                 |                         |
| CD74HC4053MG4    | LIFEBUY       | SOIC         | D                  | 16   | 40             | RoHS & Green    | NIPDAU                               | Level-1-260C-UNLIM   | -55 to 125   | HC4053M                 |                         |
| CD74HC4053MT     | LIFEBUY       | SOIC         | D                  | 16   | 250            | RoHS & Green    | NIPDAU                               | Level-1-260C-UNLIM   | -55 to 125   | HC4053M                 |                         |

| Orderable Device | Status<br>(1) | Package Type | Package<br>Drawing | Pins | Package<br>Qty | Eco Plan<br>(2) | Lead finish/<br>Ball material<br>(6) | MSL Peak Temp<br>(3) | Op Temp (°C) | Device Marking<br>(4/5) | Samples                 |
|------------------|---------------|--------------|--------------------|------|----------------|-----------------|--------------------------------------|----------------------|--------------|-------------------------|-------------------------|
| CD74HC4053NSR    | ACTIVE        | SO           | NS                 | 16   | 2000           | RoHS & Green    | NIPDAU                               | Level-1-260C-UNLIM   | -55 to 125   | HC4053M                 | <a href="#">Samples</a> |
| CD74HC4053PW     | LIFEBUY       | TSSOP        | PW                 | 16   | 90             | RoHS & Green    | NIPDAU                               | Level-1-260C-UNLIM   | -55 to 125   | HJ4053                  |                         |
| CD74HC4053PWR    | ACTIVE        | TSSOP        | PW                 | 16   | 2000           | RoHS & Green    | NIPDAU   SN                          | Level-1-260C-UNLIM   | -55 to 125   | HJ4053                  | <a href="#">Samples</a> |
| CD74HC4053PWRG4  | LIFEBUY       | TSSOP        | PW                 | 16   | 2000           | RoHS & Green    | NIPDAU                               | Level-1-260C-UNLIM   | -55 to 125   | HJ4053                  |                         |
| CD74HC4053PWT    | LIFEBUY       | TSSOP        | PW                 | 16   | 250            | RoHS & Green    | NIPDAU                               | Level-1-260C-UNLIM   | -55 to 125   | HJ4053                  |                         |
| CD74HCT4051E     | ACTIVE        | PDIP         | N                  | 16   | 25             | RoHS & Green    | NIPDAU                               | N / A for Pkg Type   | -55 to 125   | CD74HCT4051E            | <a href="#">Samples</a> |
| CD74HCT4051M     | LIFEBUY       | SOIC         | D                  | 16   | 40             | RoHS & Green    | NIPDAU                               | Level-1-260C-UNLIM   | -55 to 125   | HCT4051M                |                         |
| CD74HCT4051M96   | ACTIVE        | SOIC         | D                  | 16   | 2500           | RoHS & Green    | NIPDAU                               | Level-1-260C-UNLIM   | -55 to 125   | HCT4051M                | <a href="#">Samples</a> |
| CD74HCT4051M96E4 | ACTIVE        | SOIC         | D                  | 16   | 2500           | RoHS & Green    | NIPDAU                               | Level-1-260C-UNLIM   | -55 to 125   | HCT4051M                | <a href="#">Samples</a> |
| CD74HCT4051M96G4 | ACTIVE        | SOIC         | D                  | 16   | 2500           | RoHS & Green    | NIPDAU                               | Level-1-260C-UNLIM   | -55 to 125   | HCT4051M                | <a href="#">Samples</a> |
| CD74HCT4051ME4   | LIFEBUY       | SOIC         | D                  | 16   | 40             | RoHS & Green    | NIPDAU                               | Level-1-260C-UNLIM   | -55 to 125   | HCT4051M                |                         |
| CD74HCT4051MG4   | LIFEBUY       | SOIC         | D                  | 16   | 40             | RoHS & Green    | NIPDAU                               | Level-1-260C-UNLIM   | -55 to 125   | HCT4051M                |                         |
| CD74HCT4051MT    | LIFEBUY       | SOIC         | D                  | 16   | 250            | RoHS & Green    | NIPDAU                               | Level-1-260C-UNLIM   | -55 to 125   | HCT4051M                |                         |
| CD74HCT4052E     | ACTIVE        | PDIP         | N                  | 16   | 25             | RoHS & Green    | NIPDAU                               | N / A for Pkg Type   | -55 to 125   | CD74HCT4052E            | <a href="#">Samples</a> |
| CD74HCT4052EE4   | ACTIVE        | PDIP         | N                  | 16   | 25             | RoHS & Green    | NIPDAU                               | N / A for Pkg Type   | -55 to 125   | CD74HCT4052E            | <a href="#">Samples</a> |
| CD74HCT4052M     | LIFEBUY       | SOIC         | D                  | 16   | 40             | RoHS & Green    | NIPDAU                               | Level-1-260C-UNLIM   | -55 to 125   | HCT4052M                |                         |
| CD74HCT4052M96   | ACTIVE        | SOIC         | D                  | 16   | 2500           | RoHS & Green    | NIPDAU                               | Level-1-260C-UNLIM   | -55 to 125   | HCT4052M                | <a href="#">Samples</a> |
| CD74HCT4052M96G4 | ACTIVE        | SOIC         | D                  | 16   | 2500           | RoHS & Green    | NIPDAU                               | Level-1-260C-UNLIM   | -55 to 125   | HCT4052M                | <a href="#">Samples</a> |
| CD74HCT4052MT    | LIFEBUY       | SOIC         | D                  | 16   | 250            | RoHS & Green    | NIPDAU                               | Level-1-260C-UNLIM   | -55 to 125   | HCT4052M                |                         |
| CD74HCT4053E     | ACTIVE        | PDIP         | N                  | 16   | 25             | RoHS & Green    | NIPDAU                               | N / A for Pkg Type   | -55 to 125   | CD74HCT4053E            | <a href="#">Samples</a> |
| CD74HCT4053M     | LIFEBUY       | SOIC         | D                  | 16   | 40             | RoHS & Green    | NIPDAU                               | Level-1-260C-UNLIM   | -55 to 125   | HCT4053M                |                         |
| CD74HCT4053M96   | ACTIVE        | SOIC         | D                  | 16   | 2500           | RoHS & Green    | NIPDAU                               | Level-1-260C-UNLIM   | -55 to 125   | HCT4053M                | <a href="#">Samples</a> |
| CD74HCT4053M96E4 | ACTIVE        | SOIC         | D                  | 16   | 2500           | RoHS & Green    | NIPDAU                               | Level-1-260C-UNLIM   | -55 to 125   | HCT4053M                | <a href="#">Samples</a> |
| CD74HCT4053M96G4 | ACTIVE        | SOIC         | D                  | 16   | 2500           | RoHS & Green    | NIPDAU                               | Level-1-260C-UNLIM   | -55 to 125   | HCT4053M                | <a href="#">Samples</a> |

| Orderable Device | Status<br>(1) | Package Type | Package<br>Drawing | Pins | Package<br>Qty | Eco Plan<br>(2) | Lead finish/<br>Ball material<br>(6) | MSL Peak Temp<br>(3) | Op Temp (°C) | Device Marking<br>(4/5) | Samples |
|------------------|---------------|--------------|--------------------|------|----------------|-----------------|--------------------------------------|----------------------|--------------|-------------------------|---------|
| CD74HCT4053ME4   | LIFEBUY       | SOIC         | D                  | 16   | 40             | RoHS & Green    | NIPDAU                               | Level-1-260C-UNLIM   | -55 to 125   | HCT4053M                |         |
| CD74HCT4053MT    | LIFEBUY       | SOIC         | D                  | 16   | 250            | RoHS & Green    | NIPDAU                               | Level-1-260C-UNLIM   | -55 to 125   | HCT4053M                |         |
| CD74HCT4053PWR   | ACTIVE        | TSSOP        | PW                 | 16   | 2000           | RoHS & Green    | NIPDAU   SN                          | Level-1-260C-UNLIM   | -55 to 125   | HK4053                  | Samples |
| CD74HCT4053PWRE4 | LIFEBUY       | TSSOP        | PW                 | 16   | 2000           | RoHS & Green    | NIPDAU                               | Level-1-260C-UNLIM   | -55 to 125   | HK4053                  |         |
| CD74HCT4053PWRG4 | LIFEBUY       | TSSOP        | PW                 | 16   | 2000           | RoHS & Green    | NIPDAU                               | Level-1-260C-UNLIM   | -55 to 125   | HK4053                  |         |
| CD74HCT4053PWT   | LIFEBUY       | TSSOP        | PW                 | 16   | 250            | RoHS & Green    | NIPDAU                               | Level-1-260C-UNLIM   | -55 to 125   | HK4053                  |         |

(1) The marketing status values are defined as follows:

**ACTIVE:** Product device recommended for new designs.

**LIFEBUY:** TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

**NRND:** Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

**PREVIEW:** Device has been announced but is not in production. Samples may or may not be available.

**OBSOLETE:** TI has discontinued the production of the device.

(2) **RoHS:** TI defines "RoHS" to mean semiconductor products that are compliant with the current EU RoHS requirements for all 10 RoHS substances, including the requirement that RoHS substance do not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, "RoHS" products are suitable for use in specified lead-free processes. TI may reference these types of products as "Pb-Free".

**RoHS Exempt:** TI defines "RoHS Exempt" to mean products that contain lead but are compliant with EU RoHS pursuant to a specific EU RoHS exemption.

**Green:** TI defines "Green" to mean the content of Chlorine (Cl) and Bromine (Br) based flame retardants meet JS709B low halogen requirements of <=1000ppm threshold. Antimony trioxide based flame retardants must also meet the <=1000ppm threshold requirement.

(3) MSL, Peak Temp. - The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

(4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

(5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

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

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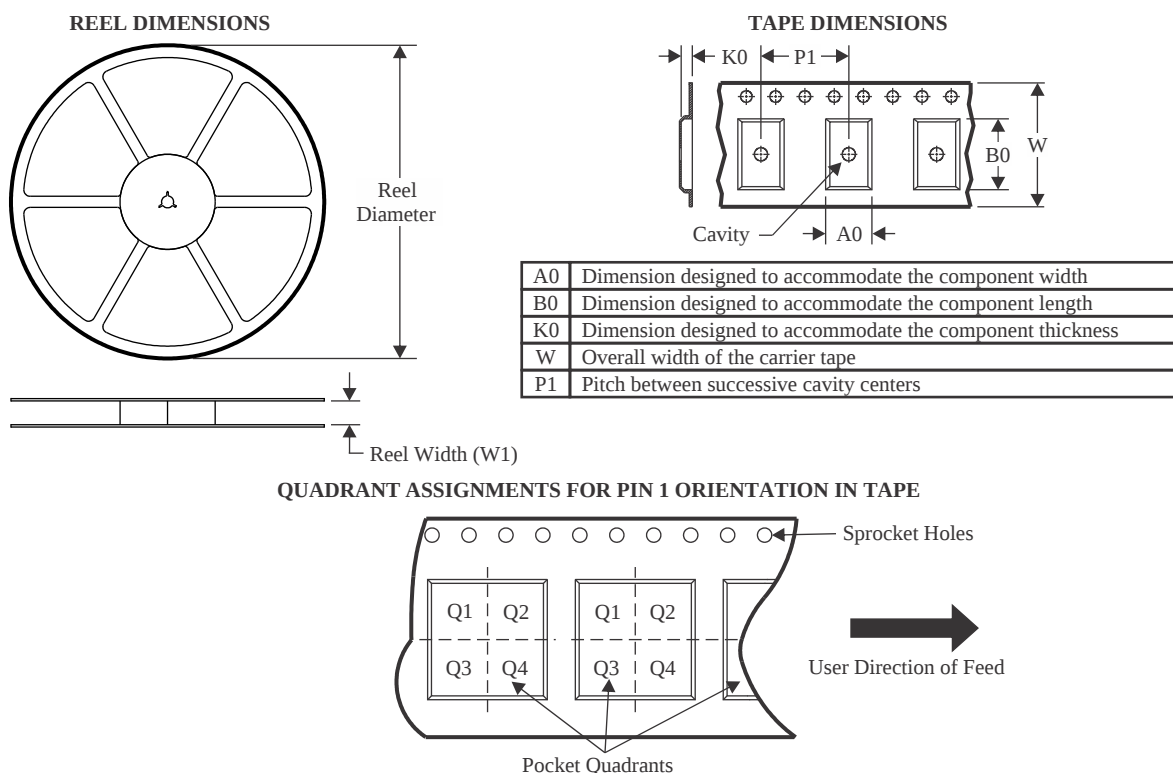
**OTHER QUALIFIED VERSIONS OF CD54HC4051, CD54HC4052, CD54HC4053, CD54HCT4051, CD74HC4051, CD74HC4052, CD74HC4053, CD74HCT4051 :**

- Catalog : [CD74HC4051](#), [CD74HC4052](#), [CD74HC4053](#), [CD74HCT4051](#)
- Automotive : [CD74HC4051-Q1](#), [CD74HCT4051-Q1](#), [CD74HC4051-Q1](#), [CD74HCT4051-Q1](#)
- Enhanced Product : [CD74HC4051-EP](#), [CD74HC4051-EP](#)
- Military : [CD54HC4051](#), [CD54HC4052](#), [CD54HC4053](#), [CD54HCT4051](#)

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

## TAPE AND REEL INFORMATION



\*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 |
|-----------------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| CD74HC4051M96   | SOIC         | D               | 16   | 2500 | 330.0              | 16.4               | 6.5     | 10.3    | 2.1     | 8.0     | 16.0   | Q1            |
| CD74HC4051M96G3 | SOIC         | D               | 16   | 2500 | 330.0              | 16.8               | 6.5     | 10.3    | 2.1     | 8.0     | 16.0   | Q1            |
| CD74HC4051M96G4 | SOIC         | D               | 16   | 2500 | 330.0              | 16.4               | 6.5     | 10.3    | 2.1     | 8.0     | 16.0   | Q1            |
| CD74HC4051NSR   | SO           | NS              | 16   | 2000 | 330.0              | 16.4               | 8.2     | 10.5    | 2.5     | 12.0    | 16.0   | Q1            |
| CD74HC4051PWR   | TSSOP        | PW              | 16   | 2000 | 330.0              | 12.4               | 6.9     | 5.6     | 1.6     | 8.0     | 12.0   | Q1            |
| CD74HC4051PWRG4 | TSSOP        | PW              | 16   | 2000 | 330.0              | 12.4               | 6.9     | 5.6     | 1.6     | 8.0     | 12.0   | Q1            |
| CD74HC4051PWT   | TSSOP        | PW              | 16   | 250  | 330.0              | 12.4               | 6.9     | 5.6     | 1.6     | 8.0     | 12.0   | Q1            |
| CD74HC4052M96   | SOIC         | D               | 16   | 2500 | 330.0              | 16.4               | 6.5     | 10.3    | 2.1     | 8.0     | 16.0   | Q1            |
| CD74HC4052M96G4 | SOIC         | D               | 16   | 2500 | 330.0              | 16.4               | 6.5     | 10.3    | 2.1     | 8.0     | 16.0   | Q1            |
| CD74HC4052NSR   | SO           | NS              | 16   | 2000 | 330.0              | 16.4               | 8.2     | 10.5    | 2.5     | 12.0    | 16.0   | Q1            |
| CD74HC4052PWR   | TSSOP        | PW              | 16   | 2000 | 330.0              | 12.4               | 6.9     | 5.6     | 1.6     | 8.0     | 12.0   | Q1            |
| CD74HC4052PWRG4 | TSSOP        | PW              | 16   | 2000 | 330.0              | 12.4               | 6.9     | 5.6     | 1.6     | 8.0     | 12.0   | Q1            |
| CD74HC4052PWT   | TSSOP        | PW              | 16   | 250  | 330.0              | 12.4               | 6.9     | 5.6     | 1.6     | 8.0     | 12.0   | Q1            |
| CD74HC4053M96   | SOIC         | D               | 16   | 2500 | 330.0              | 16.4               | 6.5     | 10.3    | 2.1     | 8.0     | 16.0   | Q1            |
| CD74HC4053M96G3 | SOIC         | D               | 16   | 2500 | 330.0              | 16.8               | 6.5     | 10.3    | 2.1     | 8.0     | 16.0   | Q1            |
| CD74HC4053M96G4 | SOIC         | D               | 16   | 2500 | 330.0              | 16.4               | 6.5     | 10.3    | 2.1     | 8.0     | 16.0   | Q1            |

| 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 |
|------------------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| CD74HC4053NSR    | SO           | NS              | 16   | 2000 | 330.0              | 16.4               | 8.2     | 10.5    | 2.5     | 12.0    | 16.0   | Q1            |
| CD74HC4053PWR    | TSSOP        | PW              | 16   | 2000 | 330.0              | 12.4               | 6.9     | 5.6     | 1.6     | 8.0     | 12.0   | Q1            |
| CD74HC4053PWRG4  | TSSOP        | PW              | 16   | 2000 | 330.0              | 12.4               | 6.9     | 5.6     | 1.6     | 8.0     | 12.0   | Q1            |
| CD74HC4053PWT    | TSSOP        | PW              | 16   | 250  | 330.0              | 12.4               | 6.9     | 5.6     | 1.6     | 8.0     | 12.0   | Q1            |
| CD74HCT4051M96   | SOIC         | D               | 16   | 2500 | 330.0              | 16.4               | 6.5     | 10.3    | 2.1     | 8.0     | 16.0   | Q1            |
| CD74HCT4052M96   | SOIC         | D               | 16   | 2500 | 330.0              | 16.4               | 6.5     | 10.3    | 2.1     | 8.0     | 16.0   | Q1            |
| CD74HCT4053M96   | SOIC         | D               | 16   | 2500 | 330.0              | 16.4               | 6.5     | 10.3    | 2.1     | 8.0     | 16.0   | Q1            |
| CD74HCT4053PWR   | TSSOP        | PW              | 16   | 2000 | 330.0              | 12.4               | 6.9     | 5.6     | 1.6     | 8.0     | 12.0   | Q1            |
| CD74HCT4053PWRG4 | TSSOP        | PW              | 16   | 2000 | 330.0              | 12.4               | 6.9     | 5.6     | 1.6     | 8.0     | 12.0   | Q1            |
| CD74HCT4053PWT   | TSSOP        | PW              | 16   | 250  | 330.0              | 12.4               | 6.9     | 5.6     | 1.6     | 8.0     | 12.0   | Q1            |

## TAPE AND REEL BOX DIMENSIONS



\*All dimensions are nominal

| Device          | Package Type | Package Drawing | Pins | SPQ  | Length (mm) | Width (mm) | Height (mm) |
|-----------------|--------------|-----------------|------|------|-------------|------------|-------------|
| CD74HC4051M96   | SOIC         | D               | 16   | 2500 | 340.5       | 336.1      | 32.0        |
| CD74HC4051M96G3 | SOIC         | D               | 16   | 2500 | 364.0       | 364.0      | 27.0        |
| CD74HC4051M96G4 | SOIC         | D               | 16   | 2500 | 340.5       | 336.1      | 32.0        |
| CD74HC4051NSR   | SO           | NS              | 16   | 2000 | 367.0       | 367.0      | 38.0        |
| CD74HC4051PWR   | TSSOP        | PW              | 16   | 2000 | 356.0       | 356.0      | 35.0        |
| CD74HC4051PWRG4 | TSSOP        | PW              | 16   | 2000 | 356.0       | 356.0      | 35.0        |
| CD74HC4051PWT   | TSSOP        | PW              | 16   | 250  | 356.0       | 356.0      | 35.0        |
| CD74HC4052M96   | SOIC         | D               | 16   | 2500 | 340.5       | 336.1      | 32.0        |
| CD74HC4052M96G4 | SOIC         | D               | 16   | 2500 | 340.5       | 336.1      | 32.0        |
| CD74HC4052NSR   | SO           | NS              | 16   | 2000 | 356.0       | 356.0      | 35.0        |
| CD74HC4052PWR   | TSSOP        | PW              | 16   | 2000 | 356.0       | 356.0      | 35.0        |
| CD74HC4052PWRG4 | TSSOP        | PW              | 16   | 2000 | 356.0       | 356.0      | 35.0        |
| CD74HC4052PWT   | TSSOP        | PW              | 16   | 250  | 356.0       | 356.0      | 35.0        |
| CD74HC4053M96   | SOIC         | D               | 16   | 2500 | 340.5       | 336.1      | 32.0        |
| CD74HC4053M96G3 | SOIC         | D               | 16   | 2500 | 364.0       | 364.0      | 27.0        |
| CD74HC4053M96G4 | SOIC         | D               | 16   | 2500 | 340.5       | 336.1      | 32.0        |
| CD74HC4053NSR   | SO           | NS              | 16   | 2000 | 356.0       | 356.0      | 35.0        |
| CD74HC4053PWR   | TSSOP        | PW              | 16   | 2000 | 356.0       | 356.0      | 35.0        |

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| Device           | Package Type | Package Drawing | Pins | SPQ  | Length (mm) | Width (mm) | Height (mm) |
|------------------|--------------|-----------------|------|------|-------------|------------|-------------|
| CD74HC4053PWRG4  | TSSOP        | PW              | 16   | 2000 | 356.0       | 356.0      | 35.0        |
| CD74HC4053PWT    | TSSOP        | PW              | 16   | 250  | 356.0       | 356.0      | 35.0        |
| CD74HCT4051M96   | SOIC         | D               | 16   | 2500 | 340.5       | 336.1      | 32.0        |
| CD74HCT4052M96   | SOIC         | D               | 16   | 2500 | 340.5       | 336.1      | 32.0        |
| CD74HCT4053M96   | SOIC         | D               | 16   | 2500 | 340.5       | 336.1      | 32.0        |
| CD74HCT4053PWR   | TSSOP        | PW              | 16   | 2000 | 356.0       | 356.0      | 35.0        |
| CD74HCT4053PWRG4 | TSSOP        | PW              | 16   | 2000 | 356.0       | 356.0      | 35.0        |
| CD74HCT4053PWT   | TSSOP        | PW              | 16   | 250  | 356.0       | 356.0      | 35.0        |

## TUBE

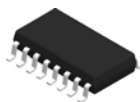


\*All dimensions are nominal

| Device         | Package Name | Package Type | Pins | SPQ | L (mm) | W (mm) | T (μm) | B (mm) |
|----------------|--------------|--------------|------|-----|--------|--------|--------|--------|
| CD74HC4051E    | N            | PDIP         | 16   | 25  | 506    | 13.97  | 11230  | 4.32   |
| CD74HC4051E    | N            | PDIP         | 16   | 25  | 506    | 13.97  | 11230  | 4.32   |
| CD74HC4051EE4  | N            | PDIP         | 16   | 25  | 506    | 13.97  | 11230  | 4.32   |
| CD74HC4051EE4  | N            | PDIP         | 16   | 25  | 506    | 13.97  | 11230  | 4.32   |
| CD74HC4051M    | D            | SOIC         | 16   | 40  | 507    | 8      | 3940   | 4.32   |
| CD74HC4051ME4  | D            | SOIC         | 16   | 40  | 507    | 8      | 3940   | 4.32   |
| CD74HC4051NS   | NS           | SOP          | 16   | 50  | 530    | 10.5   | 4000   | 4.1    |
| CD74HC4052E    | N            | PDIP         | 16   | 25  | 506    | 13.97  | 11230  | 4.32   |
| CD74HC4052E    | N            | PDIP         | 16   | 25  | 506    | 13.97  | 11230  | 4.32   |
| CD74HC4052M    | D            | SOIC         | 16   | 40  | 507    | 8      | 3940   | 4.32   |
| CD74HC4052PW   | PW           | TSSOP        | 16   | 90  | 530    | 10.2   | 3600   | 3.5    |
| CD74HC4053E    | N            | PDIP         | 16   | 25  | 506    | 13.97  | 11230  | 4.32   |
| CD74HC4053E    | N            | PDIP         | 16   | 25  | 506    | 13.97  | 11230  | 4.32   |
| CD74HC4053M    | D            | SOIC         | 16   | 40  | 507    | 8      | 3940   | 4.32   |
| CD74HC4053ME4  | D            | SOIC         | 16   | 40  | 507    | 8      | 3940   | 4.32   |
| CD74HC4053MG4  | D            | SOIC         | 16   | 40  | 507    | 8      | 3940   | 4.32   |
| CD74HC4053PW   | PW           | TSSOP        | 16   | 90  | 530    | 10.2   | 3600   | 3.5    |
| CD74HCT4051E   | N            | PDIP         | 16   | 25  | 506    | 13.97  | 11230  | 4.32   |
| CD74HCT4051E   | N            | PDIP         | 16   | 25  | 506    | 13.97  | 11230  | 4.32   |
| CD74HCT4051M   | D            | SOIC         | 16   | 40  | 507    | 8      | 3940   | 4.32   |
| CD74HCT4051ME4 | D            | SOIC         | 16   | 40  | 507    | 8      | 3940   | 4.32   |
| CD74HCT4051MG4 | D            | SOIC         | 16   | 40  | 507    | 8      | 3940   | 4.32   |
| CD74HCT4052E   | N            | PDIP         | 16   | 25  | 506    | 13.97  | 11230  | 4.32   |
| CD74HCT4052E   | N            | PDIP         | 16   | 25  | 506    | 13.97  | 11230  | 4.32   |
| CD74HCT4052EE4 | N            | PDIP         | 16   | 25  | 506    | 13.97  | 11230  | 4.32   |
| CD74HCT4052EE4 | N            | PDIP         | 16   | 25  | 506    | 13.97  | 11230  | 4.32   |
| CD74HCT4052M   | D            | SOIC         | 16   | 40  | 507    | 8      | 3940   | 4.32   |
| CD74HCT4053E   | N            | PDIP         | 16   | 25  | 506    | 13.97  | 11230  | 4.32   |
| CD74HCT4053E   | N            | PDIP         | 16   | 25  | 506    | 13.97  | 11230  | 4.32   |

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| Device         | Package Name | Package Type | Pins | SPQ | L (mm) | W (mm) | T (μm) | B (mm) |
|----------------|--------------|--------------|------|-----|--------|--------|--------|--------|
| CD74HCT4053M   | D            | SOIC         | 16   | 40  | 507    | 8      | 3940   | 4.32   |
| CD74HCT4053ME4 | D            | SOIC         | 16   | 40  | 507    | 8      | 3940   | 4.32   |

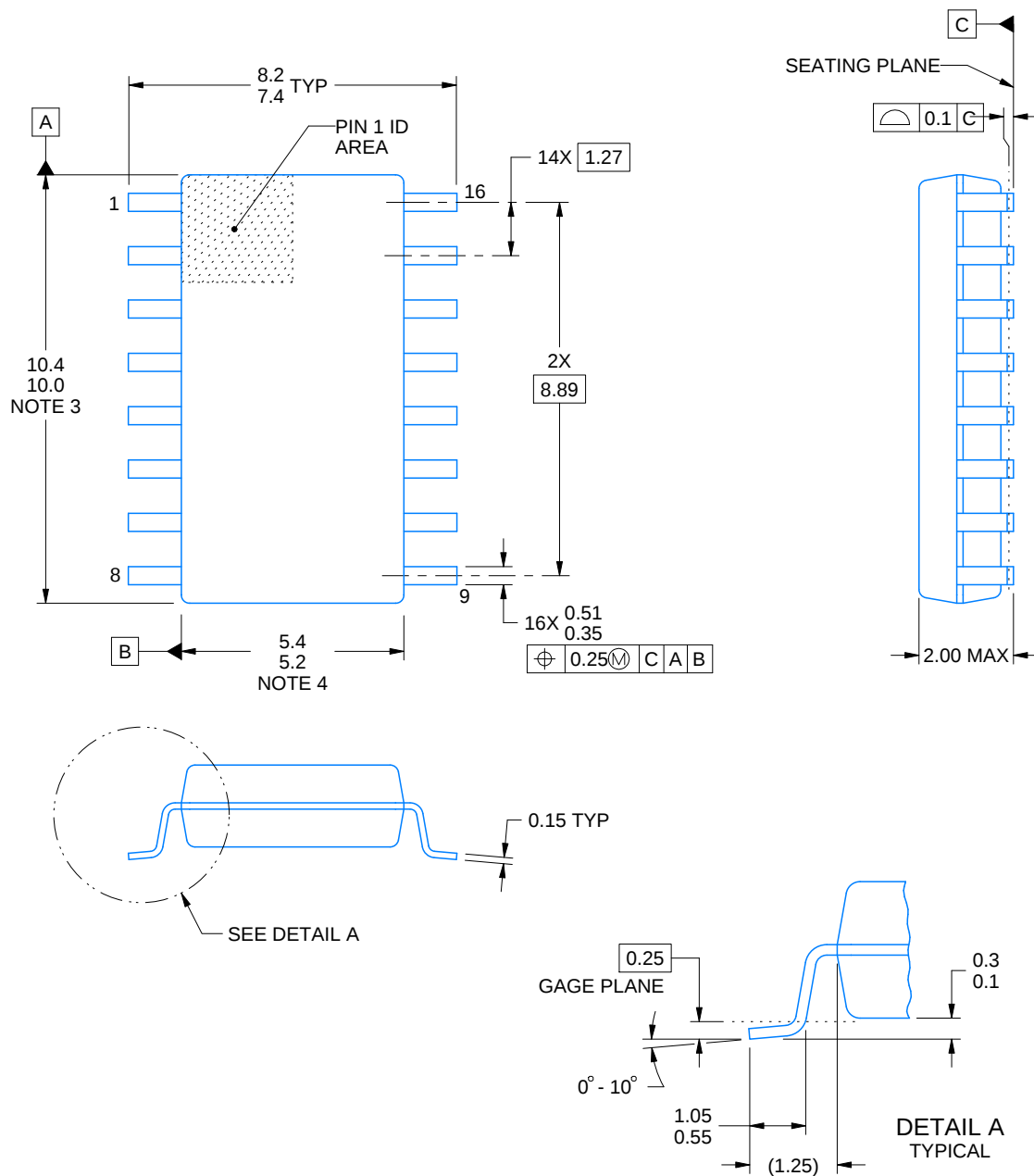


# PACKAGE OUTLINE

NS0016A

SOP - 2.00 mm max height

SOP



4220735/A 12/2021

## NOTES:

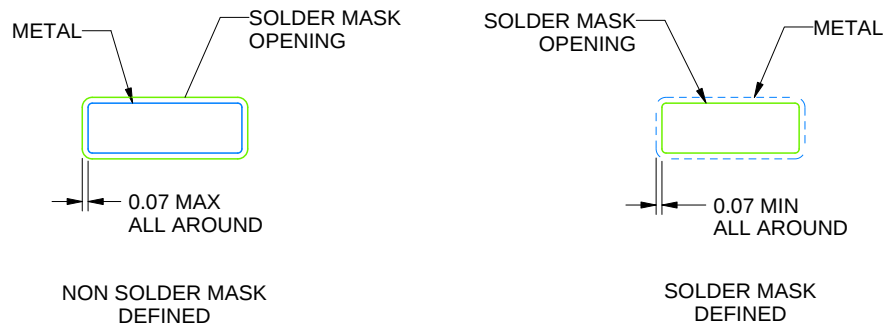
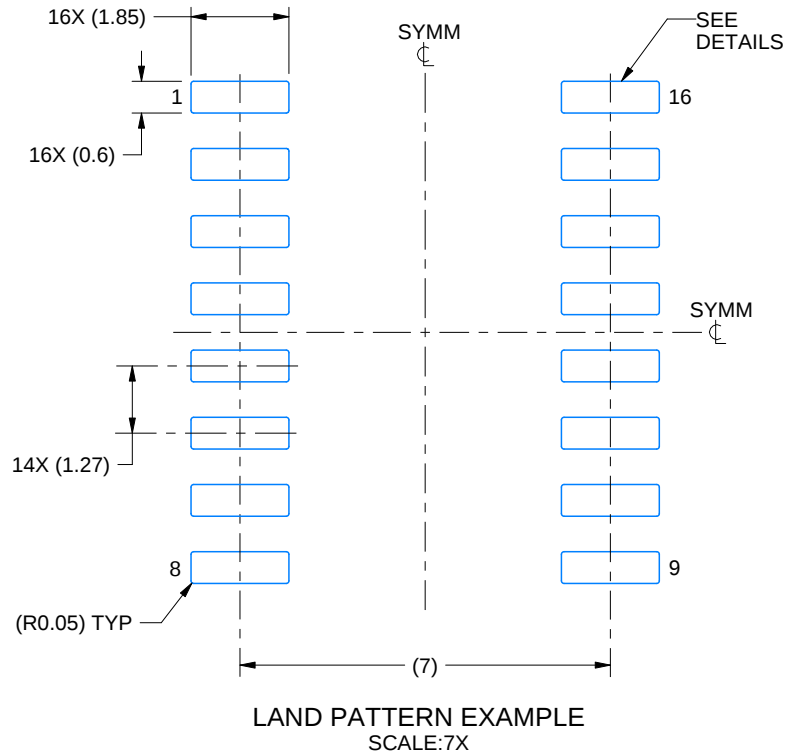
1. All linear dimensions are in millimeters. Dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 mm, per side.
4. This dimension does not include interlead flash. Interlead flash shall not exceed 0.25 mm, per side.

# EXAMPLE BOARD LAYOUT

NS0016A

SOP - 2.00 mm max height

SOP



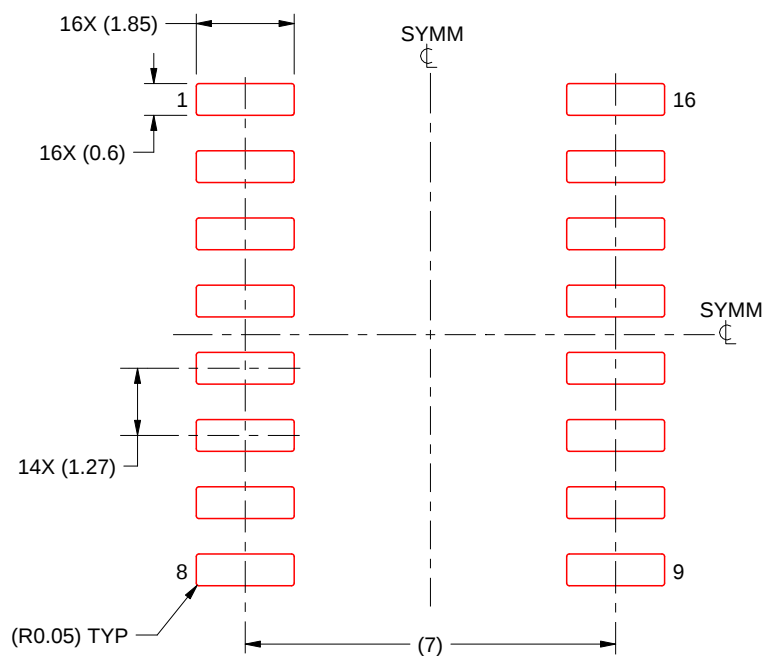
SOLDER MASK DETAILS

4220735/A 12/2021

NOTES: (continued)

5. Publication IPC-7351 may have alternate designs.

6. Solder mask tolerances between and around signal pads can vary based on board fabrication site.



SOLDER PASTE EXAMPLE  
 BASED ON 0.125 mm THICK STENCIL  
 SCALE:7X

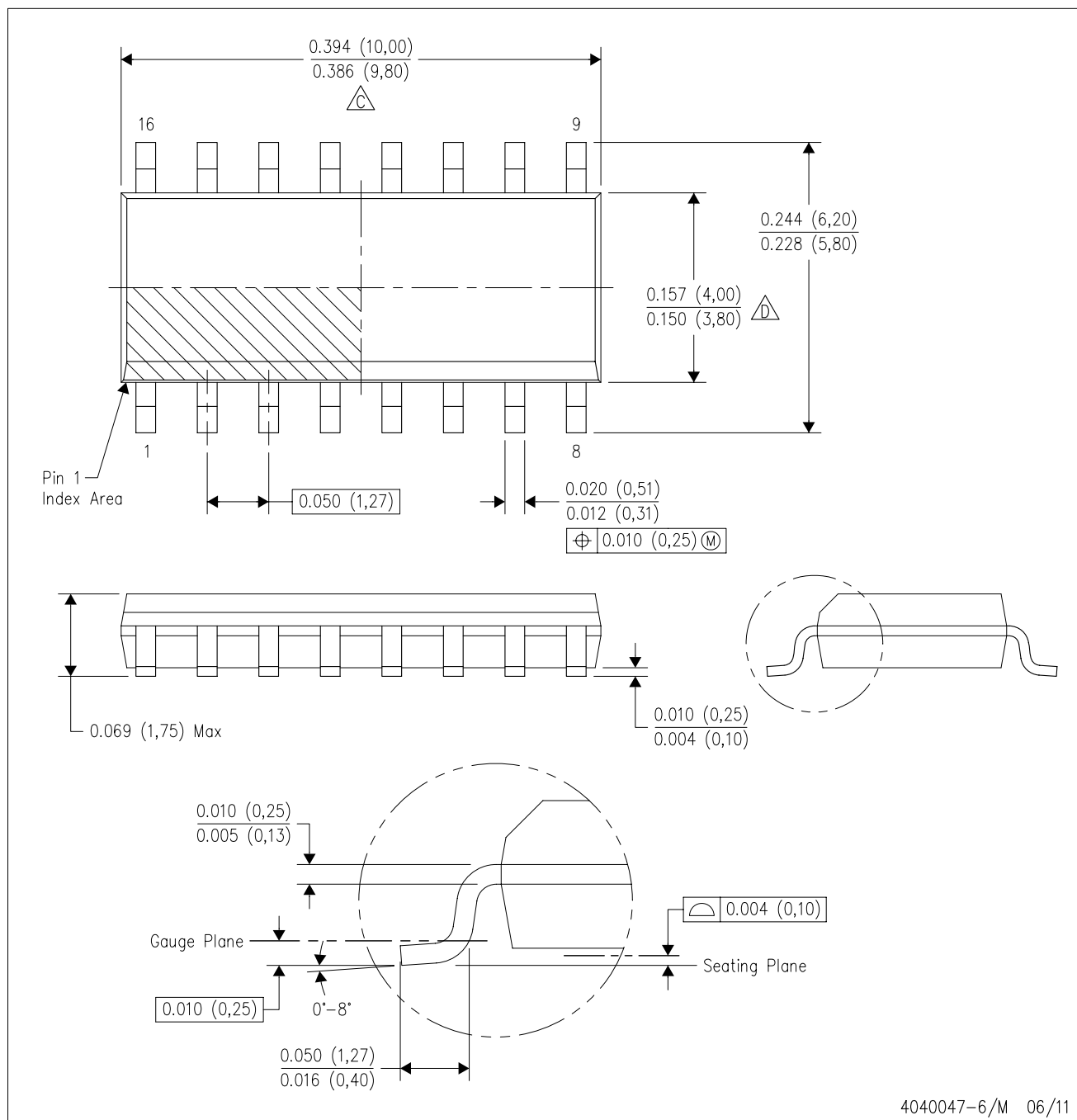
4220735/A 12/2021

NOTES: (continued)

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

D (R-PDSO-G16)

PLASTIC SMALL OUTLINE



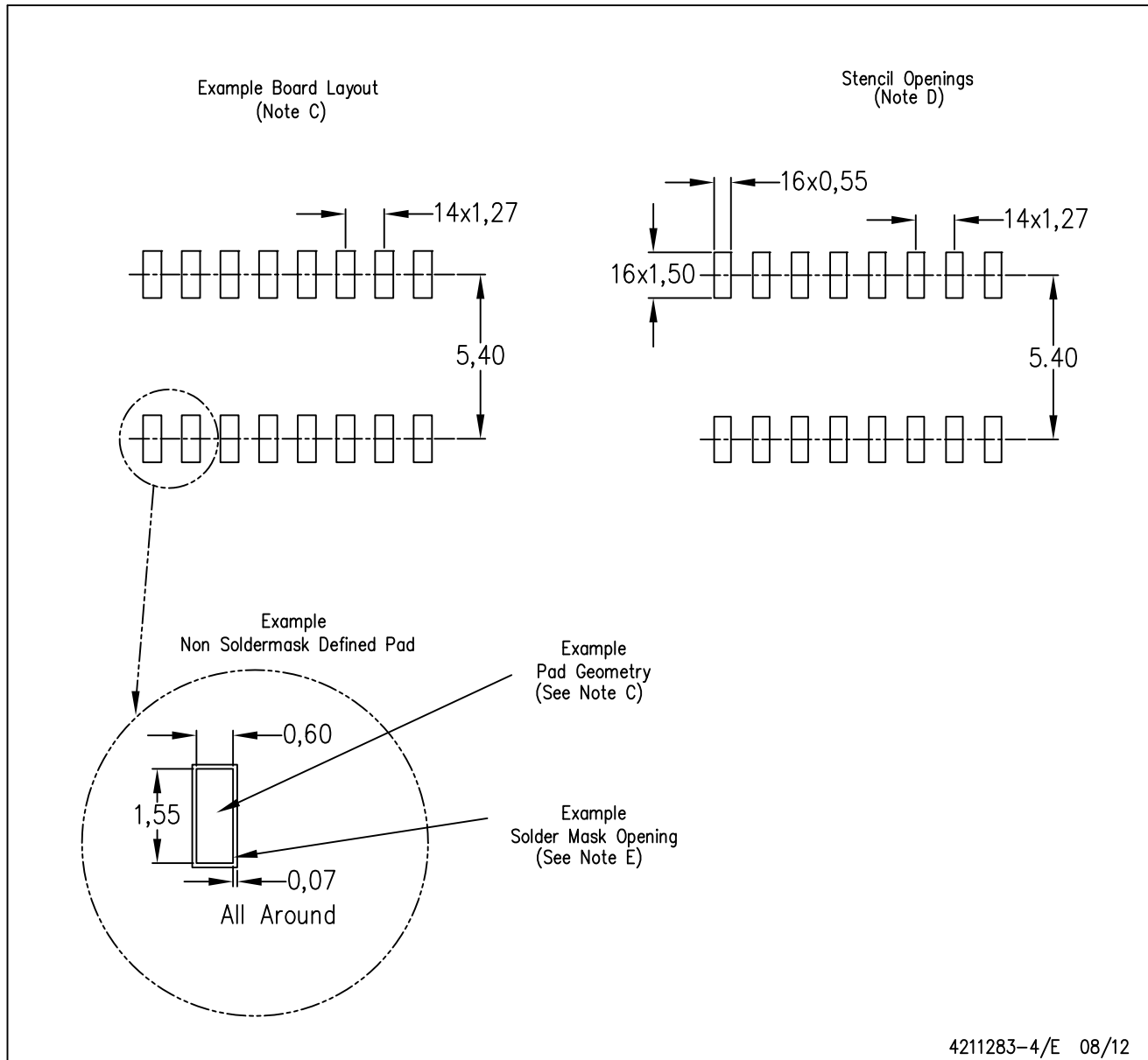
4040047-6/M 06/11

NOTES:

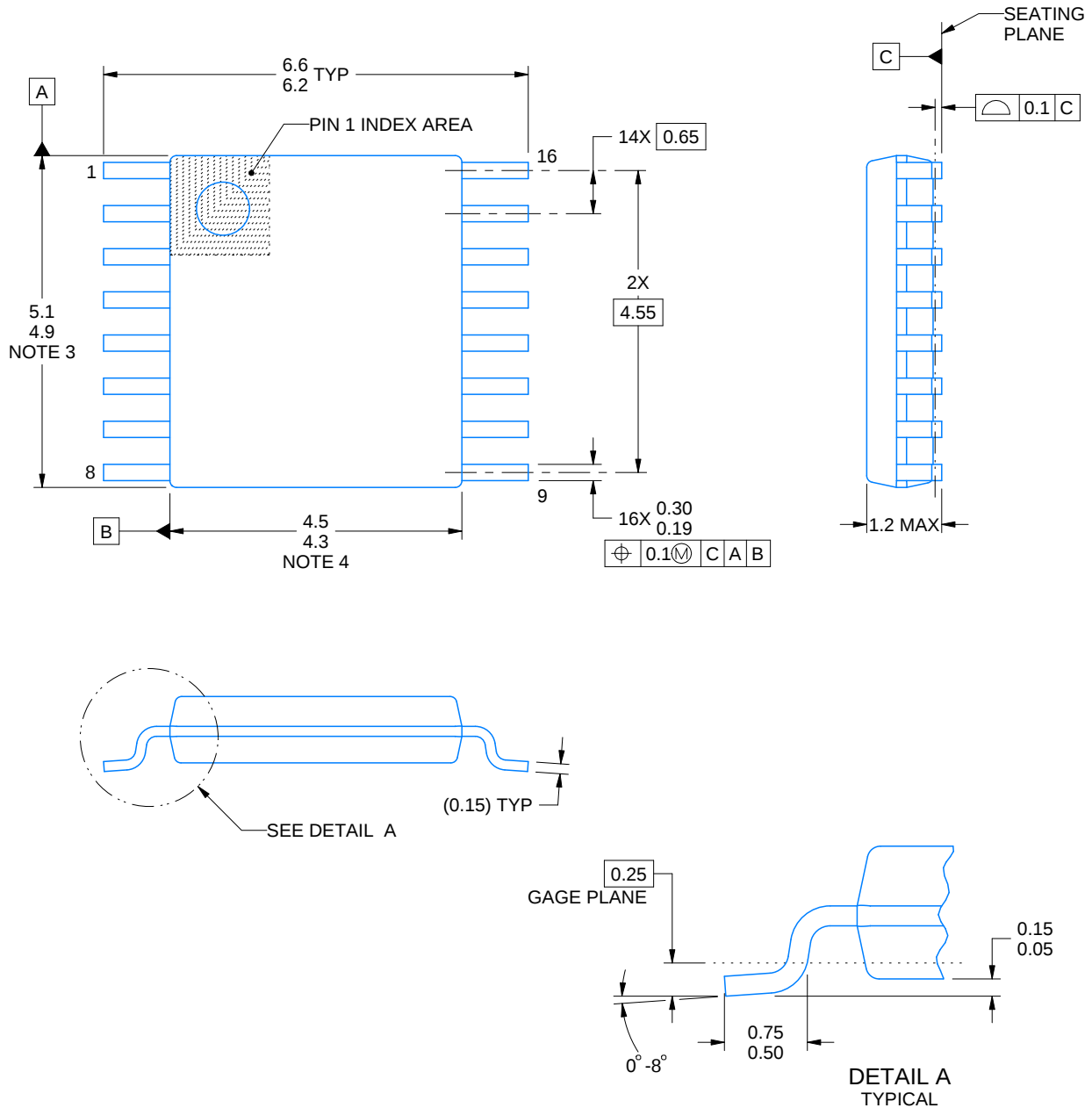
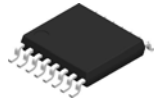
- A. All linear dimensions are in inches (millimeters).
- B. This drawing is subject to change without notice.
- C. Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.006 (0,15) each side.
- D. Body width does not include interlead flash. Interlead flash shall not exceed 0.017 (0,43) each side.
- E. Reference JEDEC MS-012 variation AC.

D (R-PDSO-G16)

PLASTIC SMALL OUTLINE



- NOTES:
- All linear dimensions are in millimeters.
  - This drawing is subject to change without notice.
  - Publication IPC-7351 is recommended for alternate designs.
  - 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.
  - Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.



4220204/A 02/2017

## NOTES:

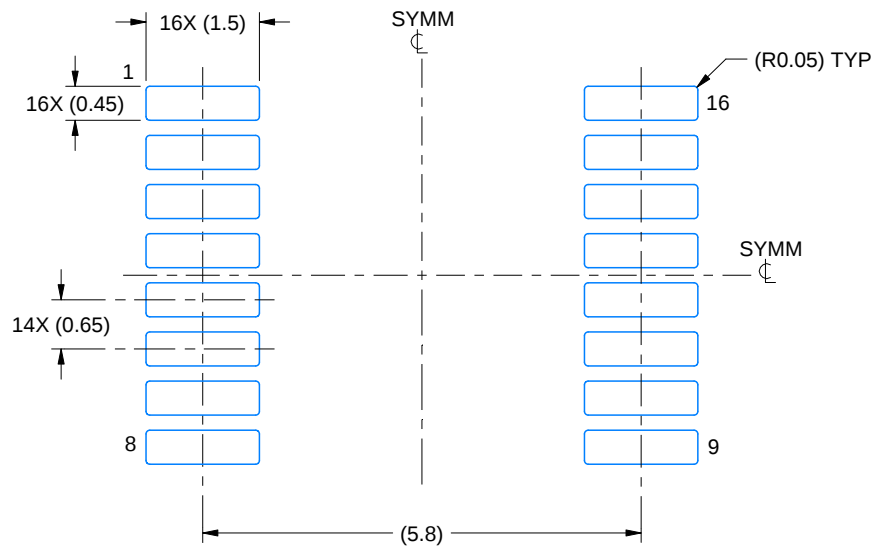
1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or 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

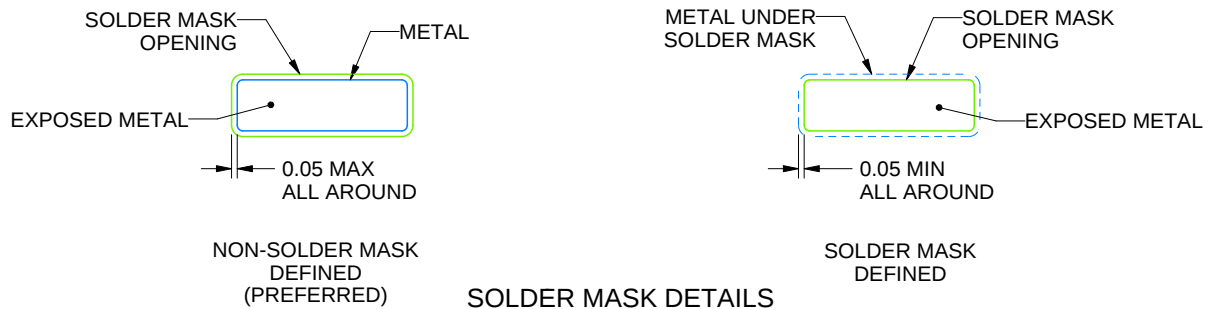
PW0016A

TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE



LAND PATTERN EXAMPLE  
EXPOSED METAL SHOWN  
SCALE: 10X



4220204/A 02/2017

NOTES: (continued)

6. Publication IPC-7351 may have alternate designs.

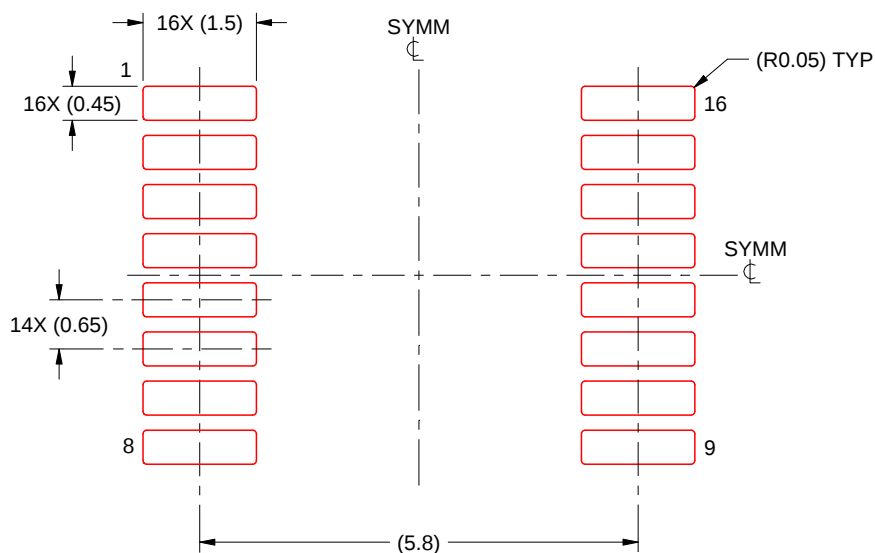
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

# EXAMPLE STENCIL DESIGN

PW0016A

TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE



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

4220204/A 02/2017

NOTES: (continued)

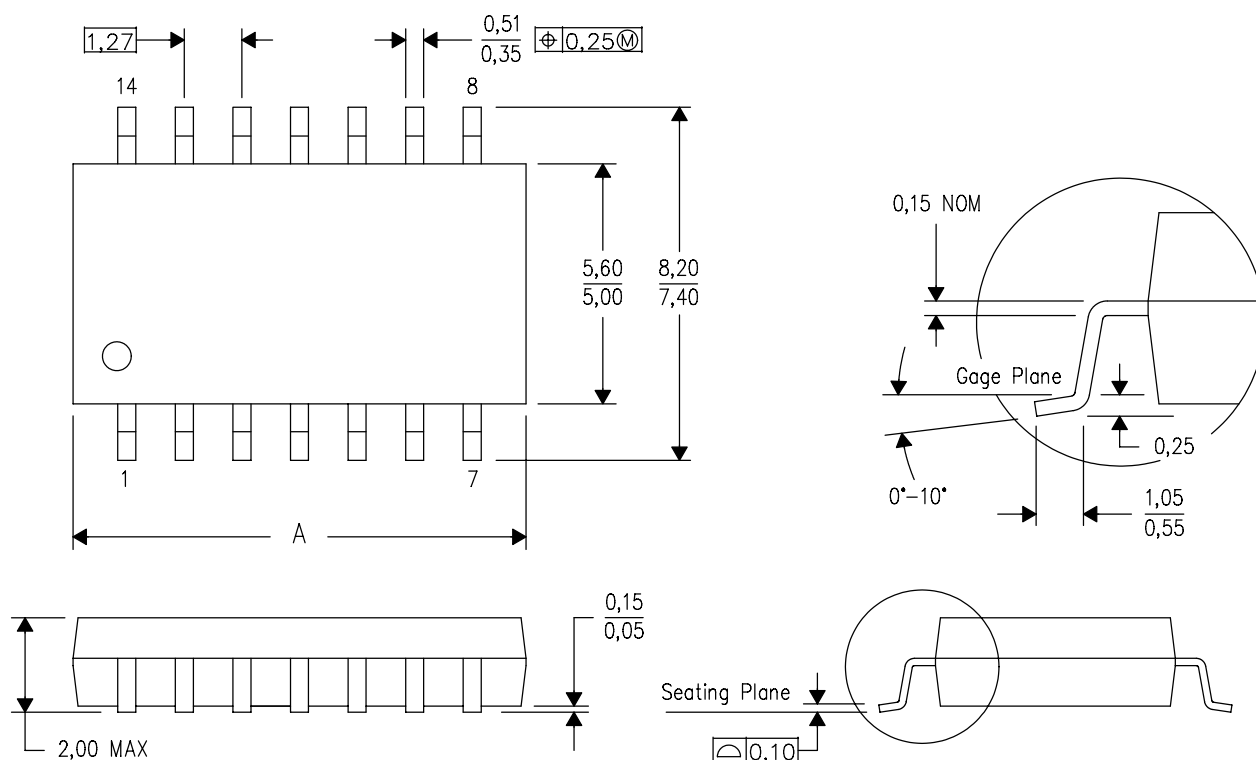
8. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
9. Board assembly site may have different recommendations for stencil design.

# MECHANICAL DATA

NS (R-PDSO-G\*\*)

PLASTIC SMALL-OUTLINE PACKAGE

14-PINS SHOWN



| DIM \ PINS ** | 14    | 16    | 20    | 24    |
|---------------|-------|-------|-------|-------|
| A MAX         | 10,50 | 10,50 | 12,90 | 15,30 |
| A MIN         | 9,90  | 9,90  | 12,30 | 14,70 |

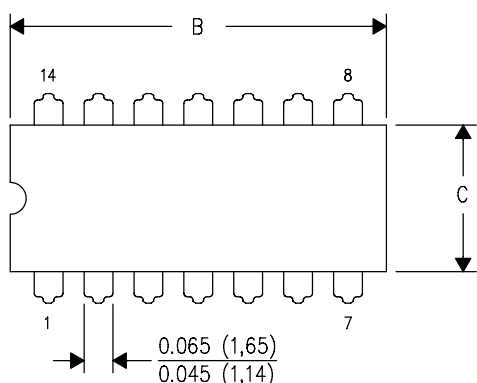
4040062/C 03/03

- 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.

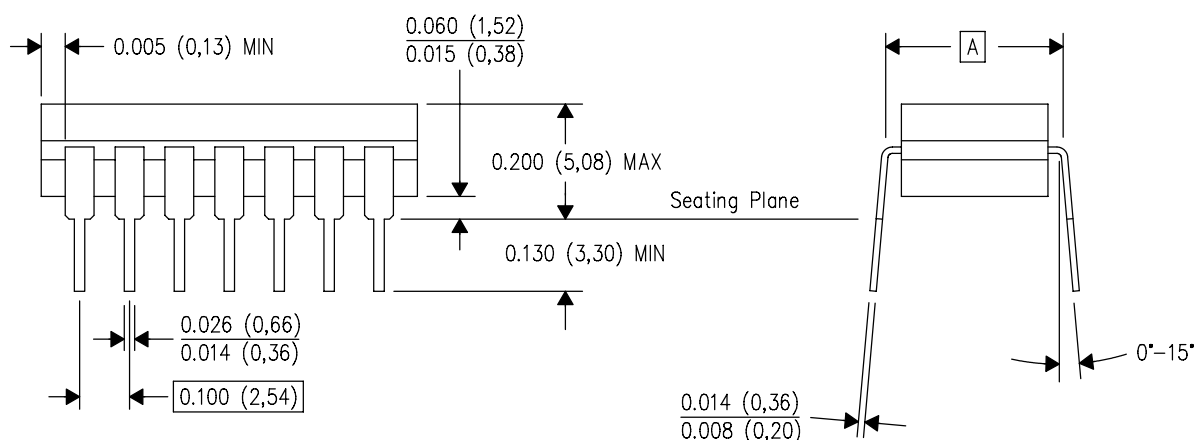
J (R-GDIP-T\*\*)

14 LEADS SHOWN

# CERAMIC DUAL IN-LINE PACKAGE



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



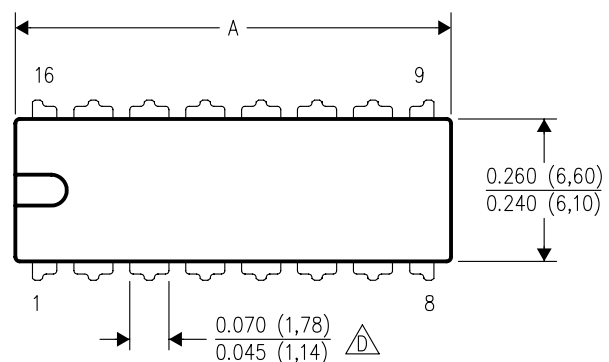
4040083/F 03/03

- 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.

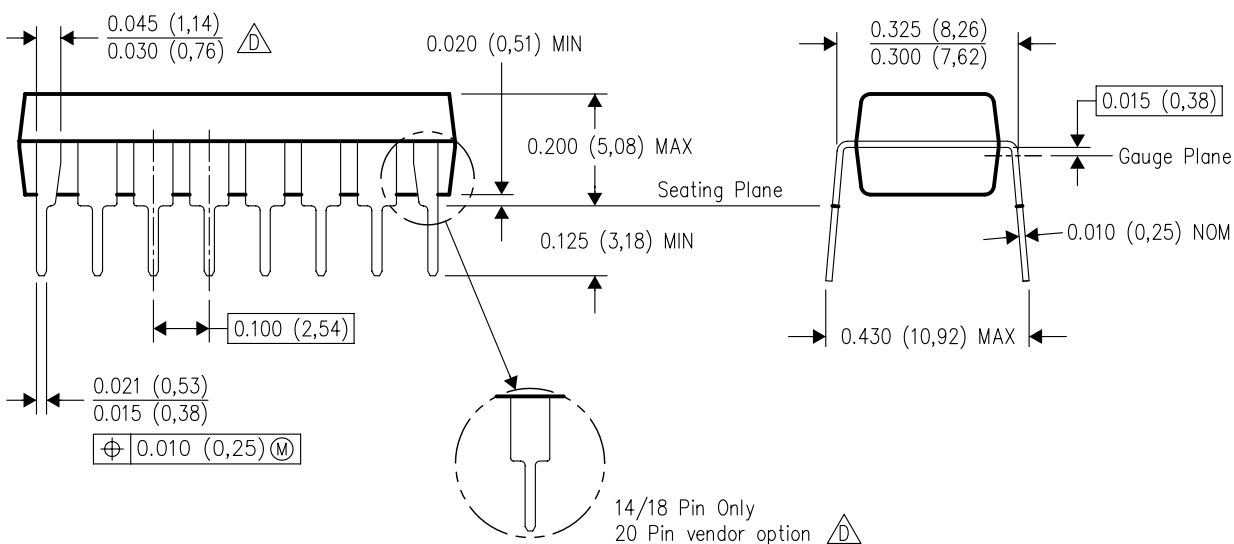
N (R-PDIP-T\*\*)

16 PINS SHOWN

## PLASTIC DUAL-IN-LINE PACKAGE



| PINS **<br>DIM      | 14               | 16               | 18               | 20               |
|---------------------|------------------|------------------|------------------|------------------|
| A MAX               | 0.775<br>(19,69) | 0.775<br>(19,69) | 0.920<br>(23,37) | 1.060<br>(26,92) |
| A MIN               | 0.745<br>(18,92) | 0.745<br>(18,92) | 0.850<br>(21,59) | 0.940<br>(23,88) |
| MS-001<br>VARIATION | AA               | BB               | AC               | AD               |



4040049/E 12/2002

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.

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