

## SN54HC688、SN74HC688 8 ビット ID コンパレータ

### 1 特長

- 幅広い動作電圧範囲: 2V~6V
- 大電流出力は最大 10 個の LSTTL 負荷を駆動可能
- 低消費電力、 $I_{CC}$ : 80 $\mu$ A 以下
- $t_{pd} = 14$ ns (標準値)
- 5V で  $\pm 4$ mA の出力駆動能力
- 低い入力電流: 最大 1 $\mu$ A
- 2 つの 8 ビット・ワードを比較

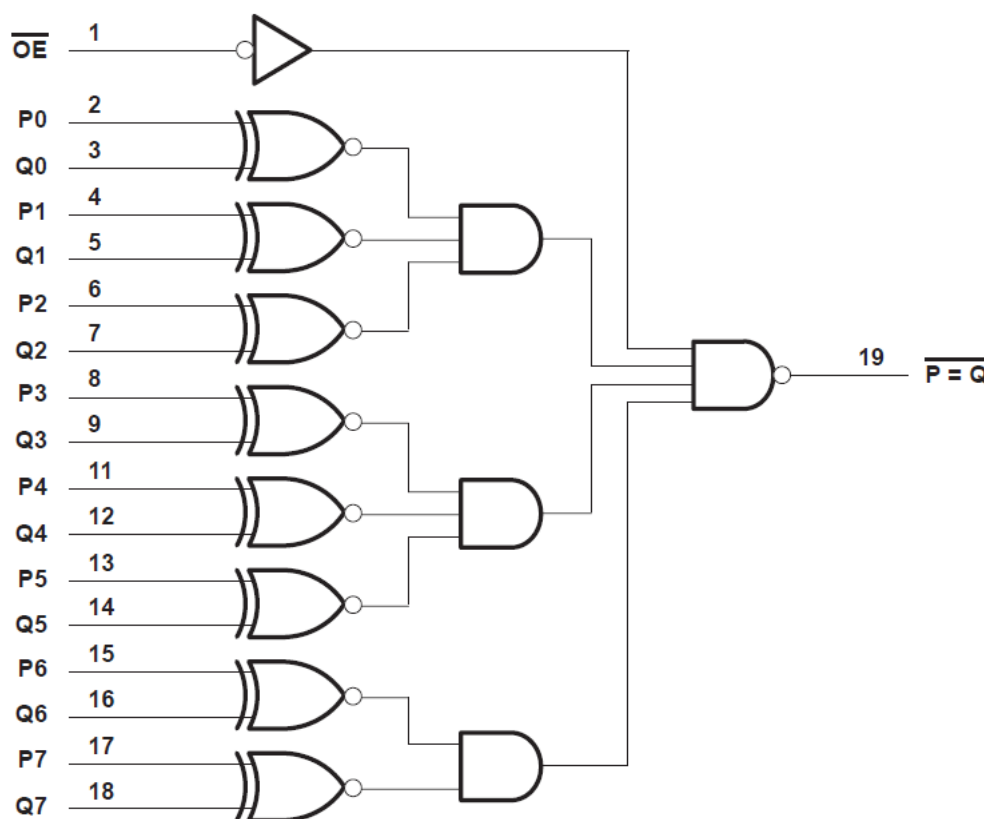
### 2 概要

これらの ID コンパレータは、2 つの 8 ビット・バイナリ・ワードまたは BCD ワードの比較を実行します。出力イネーブル ( $\overline{OE}$ ) 入力を使用すると、出力を強制的に High レベルにすることができます。

#### 製品情報

| 部品番号         | パッケージ <sup>(1)</sup> | 本体サイズ (公称)       |
|--------------|----------------------|------------------|
| SN74HC688DW  | SOIC (20)            | 12.80mm × 7.50mm |
| SN74HC688N   | PDIP (20)            | 25.40mm × 6.35mm |
| SN74HC688PWR | TSSOP (20)           | 6.50mm × 4.40mm  |
| SN54HC688J   | CDIP (20)            | 26.92mm × 6.92mm |
| SNJ54HC688FK | LCCC (20)            | 8.89mm × 8.45mm  |

- (1) 利用可能なパッケージについては、このデータシートの末尾にある注文情報を参照してください。



機能ブロック図



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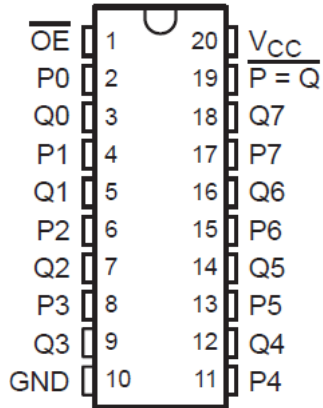
### 3 Revision History

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。

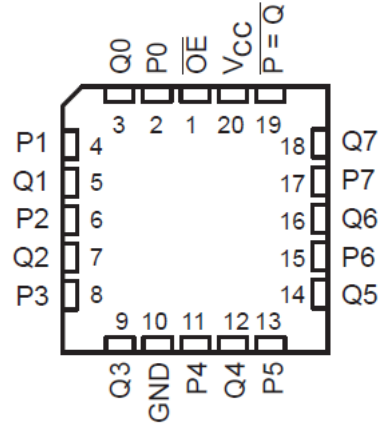
| <b>Changes from Revision E (February 2022) to Revision F (May 2022)</b>  | <b>Page</b> |
|--|-------------|
| • Junction-to-ambient thermal resistance values increased. DW was 58 is now 109.1, N was 69 is now 84.6, PW was 83 is now 131.8..... | 4           |

| <b>Changes from Revision D (August 2003) to Revision E (February 2022)</b> | <b>Page</b> |
|--|-------------|
| • 最新のデータシート規格を反映するように、文書全体の採番、書式設定、表、図、相互参照を更新.....                        | 1           |

## 4 Pin Configuration and Functions



**J, DW, N or PW package**  
**20-Pin CDIP, SOIC, PDIP, TSSOP**  
**Top View**



**FK Package**  
**20-Pin LCCC**  
**Top View**

## 5 Specifications

### 5.1 Absolute Maximum Ratings

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

|                  |   | MIN  | MAX | UNIT |
|------------------|---|--|-----|------|
| V <sub>CC</sub>  | Supply voltage range                              | -0.5   | 7   | V    |
| I <sub>IK</sub>  | Input clamp current <sup>(2)</sup>                | V <sub>I</sub> < 0 or V <sub>I</sub> > V <sub>CC</sub> | ±20 | mA   |
| I <sub>OK</sub>  | Output clamp current <sup>(2)</sup>               | V <sub>O</sub> < 0 or V <sub>O</sub> > V <sub>CC</sub> | ±20 | mA   |
| I <sub>O</sub>   | Continuous output current                         | V <sub>O</sub> = 0 to V <sub>CC</sub>                  | ±25 | mA   |
|                  | Continuous current through V <sub>CC</sub> or GND |  | ±50 | mA   |
| T <sub>J</sub>   | Junction temperature                              |  | 150 | °C   |
| T <sub>stg</sub> | Storage temperature range                         | -65  | 150 | °C   |

- (1) Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.
- (2) The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

### 5.2 Recommended Operating Conditions<sup>(1)</sup>

|                 |                                       | SN54HC688               |                 |     | SN74HC688 |                 |     | UNIT |
|-----------------|---------------------------------------|-------------------------|-----------------|-----|-----------|-----------------|-----|------|
|                 |                                       | MIN                     | NOM             | MAX | MIN       | NOM             | MAX |      |
| V <sub>CC</sub> | Supply voltage                        | 2                       | 5               | 6   | 2         | 5               | 6   | V    |
| V <sub>IH</sub> | High-level input voltage              | V <sub>CC</sub> = 2 V   | 1.5             |     | 1.5       |                 |     | V    |
|                 |                                       | V <sub>CC</sub> = 4.5 V | 3.15            |     | 3.15      |                 |     |      |
|                 |                                       | V <sub>CC</sub> = 6 V   | 4.2             |     | 4.2       |                 |     |      |
| V <sub>IL</sub> | Low-level input voltage               | V <sub>CC</sub> = 2 V   | 0.5             |     | 0.5       |                 |     | V    |
|                 |                                       | V <sub>CC</sub> = 4.5 V | 1.35            |     | 1.35      |                 |     |      |
|                 |                                       | V <sub>CC</sub> = 6 V   | 1.8             |     | 1.8       |                 |     |      |
| V <sub>I</sub>  | Input voltage                         | 0                       | V <sub>CC</sub> |     | 0         | V <sub>CC</sub> |     | V    |
| V <sub>O</sub>  | Output voltage                        | 0                       | V <sub>CC</sub> |     | 0         | V <sub>CC</sub> |     | V    |
| t <sub>t</sub>  | Input transition (rise and fall) time | V <sub>CC</sub> = 2 V   | 1000            |     | 1000      |                 |     | ns   |
|                 |                                       | V <sub>CC</sub> = 4.5 V | 500             |     | 500       |                 |     |      |
|                 |                                       | V <sub>CC</sub> = 6 V   | 400             |     | 400       |                 |     |      |
| T <sub>A</sub>  | Operating free-air temperature        | -55                     | 125             |     | -40       | 85              |     | °C   |

- (1) All unused inputs of the device must be held at V<sub>CC</sub> or GND to ensure proper device operation. Refer to the TI application report, *Implications of Slow or Floating CMOS Inputs*, literature number [SCBA004](#).

### 5.3 Thermal Information

| THERMAL METRIC        |   | DW (SOIC) | N (PDIP) | PW (TSSOP) | UNIT |
|-----------------------|---|-----------|----------|------------|------|
|                       |   | 20 PINS   | 20 PINS  | 20 PINS    |      |
| R <sub>θJA</sub>      | Junction-to-ambient thermal resistance <sup>(1)</sup> | 109.1     | 84.6     | 131.8      | °C/W |
| R <sub>θJC(top)</sub> | Junction-to-case (top) thermal resistance             | 76        | 72.5     | 72.2       | °C/W |
| R <sub>θJB</sub>      | Junction-to-board thermal resistance                  | 77.6      | 65.3     | 82.8       | °C/W |
| ψ <sub>JT</sub>       | Junction-to-top characterization parameter            | 51.5      | 55.3     | 21.5       | °C/W |
| ψ <sub>JB</sub>       | Junction-to-board characterization parameter          | 77.1      | 65.2     | 82.4       | °C/W |
| R <sub>θJC(bot)</sub> | Junction-to-case (bottom) thermal resistance          | N/A       | N/A      | N/A        | °C/W |

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

## 5.4 Electrical Characteristics

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

| PARAMETER       | TEST CONDITIONS   |                           | V <sub>CC</sub> | T <sub>A</sub> = 25°C |       |      | SN54HC688 |       | SN74HC688 |       | UNIT |    |
|-----------------|---|---------------------------|-----------------|-----------------------|-------|------|-----------|-------|-----------|-------|------|----|
|                 |   |                           |                 | MIN                   | TYP   | MAX  | MIN       | MAX   | MIN       | MAX   |      |    |
| V <sub>OH</sub> | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>       | I <sub>OH</sub> = -20 μA  | 2 V             | 1.9                   | 1.998 |      | 1.9       |       | 1.9       | V     |      |    |
|                 |   |                           | 4.5 V           | 4.4                   | 4.499 |      | 4.4       |       | 4.4       |       |      |    |
|                 |   |                           | 6 V             | 5.9                   | 5.999 |      | 5.9       |       | 5.9       |       |      |    |
|                 |   | I <sub>OH</sub> = -4 mA   | 4.5 V           | 3.98                  | 4.3   |      | 3.7       |       | 3.84      |       |      |    |
|                 |   | I <sub>OH</sub> = -5.2 mA | 6 V             | 5.48                  | 5.8   |      | 5.2       |       | 5.34      |       |      |    |
| V <sub>OL</sub> | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>       | I <sub>OL</sub> = 20 μA   | 2 V             |                       | 0.002 | 0.1  |           | 0.1   |           | 0.1   | V    |    |
|                 |   |                           | 4.5 V           |                       | 0.001 | 0.1  |           | 0.1   |           | 0.1   |      |    |
|                 |   |                           | 6 V             |                       | 0.001 | 0.1  |           | 0.1   |           | 0.1   |      |    |
|                 |   | I <sub>OL</sub> = 4 mA    | 4.5 V           |                       | 0.17  | 0.26 |           | 0.4   |           | 0.33  |      |    |
|                 |   | I <sub>OL</sub> = 5.2 mA  | 6 V             |                       | 0.15  | 0.26 |           | 0.4   |           | 0.33  |      |    |
| I <sub>I</sub>  | V <sub>I</sub> = V <sub>CC</sub> or 0                     |                           | 6 V             |                       | ±0.1  | ±100 |           | ±1000 |           | ±1000 | nA   |    |
| I <sub>CC</sub> | V <sub>I</sub> = V <sub>CC</sub> or 0, I <sub>O</sub> = 0 |                           | 6 V             |                       |       | 8    |           | 160   |           | 80    | μA   |    |
| C <sub>i</sub>  |   |                           | 2 V to 6 V      |                       |       | 3    | 10        |       | 10        |       | 10   | pF |

## 5.5 Switching Characteristics

over recommended operating free-air temperature range, C<sub>L</sub> = 50 pF (unless otherwise noted) (see [Parameter Measurement Information](#))

| PARAMETER       | FROM (INPUT) | TO (OUTPUT) | V <sub>CC</sub> | T <sub>A</sub> = 25°C |     |     | SN54HC688 |     | SN74HC688 |     | UNIT |
|-----------------|--------------|-------------|-----------------|-----------------------|-----|-----|-----------|-----|-----------|-----|------|
|                 |              |             |                 | MIN                   | TYP | MAX | MIN       | MAX | MIN       | MAX |      |
| t <sub>pd</sub> | P or Q       | P = Q       | 2 V             |                       | 113 | 210 |           | 313 |           | 265 | ns   |
|                 |              |             | 4.5 V           |                       | 30  | 42  |           | 63  |           | 53  |      |
|                 |              |             | 6 V             |                       | 24  | 36  |           | 53  |           | 45  |      |
|                 | OE           | P = Q       | 2 V             |                       | 66  | 120 |           | 179 |           | 151 |      |
|                 |              |             | 4.5 V           |                       | 16  | 24  |           | 36  |           | 30  |      |
|                 |              |             | 6 V             |                       | 14  | 20  |           | 30  |           | 26  |      |
| t <sub>t</sub>  |              | Any         | 2 V             |                       | 38  | 75  |           | 110 |           | 95  | ns   |
|                 |              |             | 4.5 V           |                       | 8   | 15  |           | 22  |           | 19  |      |
|                 |              |             | 6 V             |                       | 6   | 13  |           | 19  |           | 16  |      |

## 5.6 Operating Characteristics

T<sub>A</sub> = 25°C

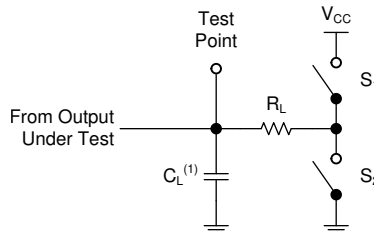
| PARAMETER       | TEST CONDITIONS               | TYP | UNIT |
|-----------------|-------------------------------|-----|------|
| C <sub>pd</sub> | Power dissipation capacitance | 40  | pF   |

## 6 Parameter Measurement Information

Phase relationships between waveforms were chosen arbitrarily. All input pulses are supplied by generators having the following characteristics:  $PRR \leq 1 \text{ MHz}$ ,  $Z_O = 50 \Omega$ ,  $t_t < 6 \text{ ns}$ .

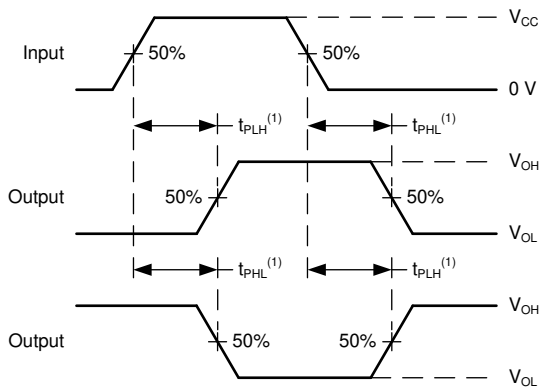
For clock inputs,  $f_{\text{max}}$  is measured when the input duty cycle is 50%.

The outputs are measured one at a time with one input transition per measurement.



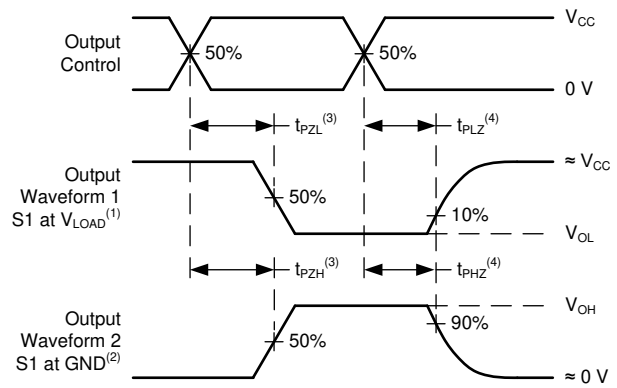
(1)  $C_L$  includes probe and test-fixture capacitance.

**6-1. Load Circuit for 3-State Outputs**



(1) The greater between  $t_{\text{PLH}}$  and  $t_{\text{PHL}}$  is the same as  $t_{\text{pd}}$ .

**6-2. Voltage Waveforms, Propagation Delays for Standard CMOS Inputs**



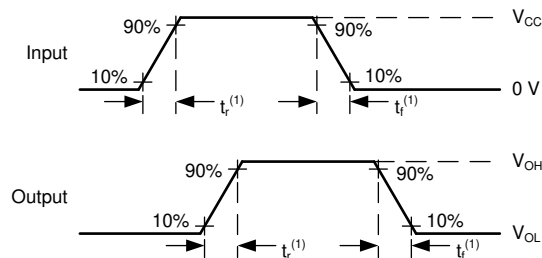
(1) S1 = CLOSED; S2 = OPEN.

(2) S1 = OPEN; S2 = CLOSED.

(3)  $t_{\text{PZL}}$  and  $t_{\text{PHZ}}$  are the same as  $t_{\text{dis}}$ .

(4)  $t_{\text{PZL}}$  and  $t_{\text{PZH}}$  are the same as  $t_{\text{en}}$ .

**6-3. Voltage Waveforms, Standard CMOS Inputs Propagation Delays**



(1) The greater between  $t_r$  and  $t_f$  is the same as  $t_t$ .

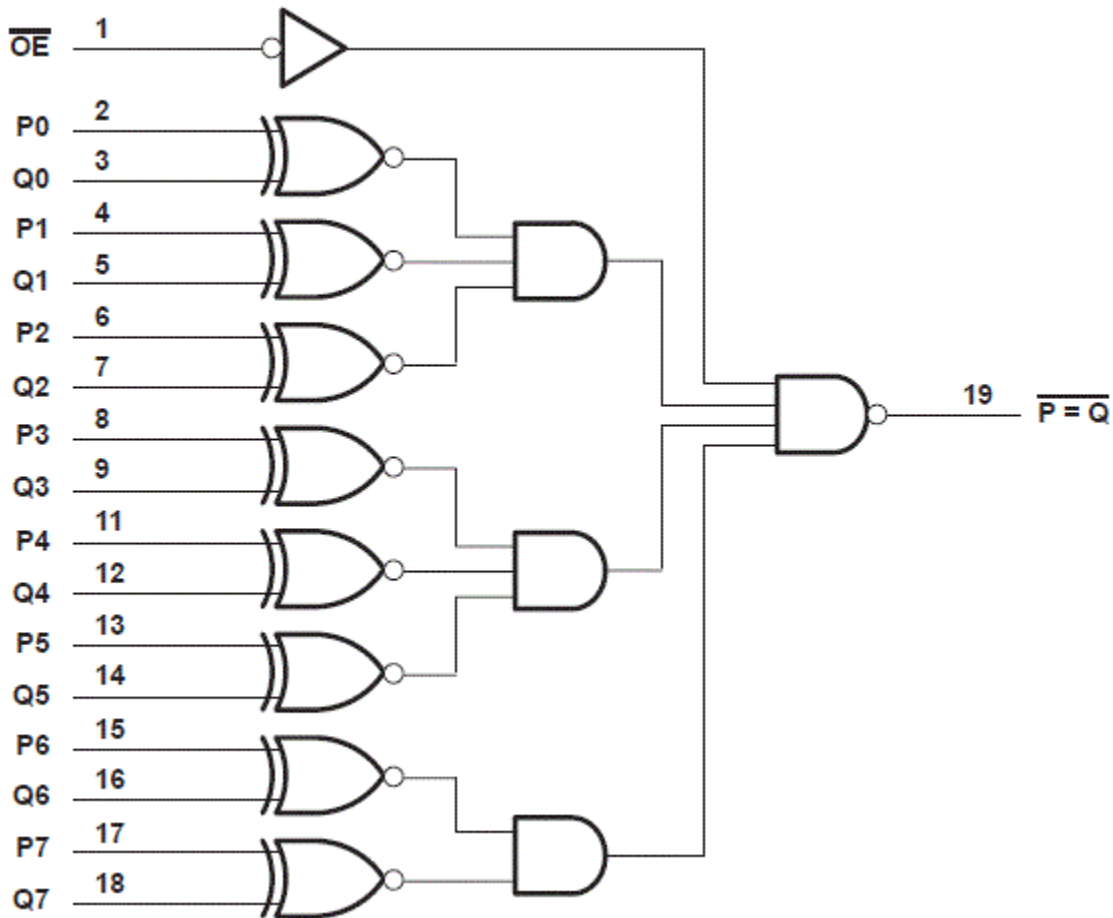
**6-4. Voltage Waveforms, Input and Output Transition Times for Standard CMOS Inputs**

## 7 Detailed Description

### 7.1 Overview

These identity comparators perform comparisons of two 8-bit binary or BCD words. An output-enable ( $\overline{OE}$ ) input may be used to force the output to the high level.

### 7.2 Functional Block Diagram



### 7.3 Device Functional Modes

表 7-1. Function Table

| INPUTS       |    | OUTPUT<br>$P = Q$ |
|--------------|----|-------------------|
| DATA<br>P, Q | OE |                   |
| $P = Q$      | L  | L                 |
| $P > Q$      | X  | H                 |
| $P < Q$      | X  | H                 |
| X            | H  | H                 |

## 8 Power Supply Recommendations

The power supply can be any voltage between the minimum and maximum supply voltage rating located in the *Recommended Operating Conditions*. Each  $V_{CC}$  terminal should have a good bypass capacitor to prevent power disturbance. A 0.1- $\mu\text{F}$  capacitor is recommended for this device. It is acceptable to parallel multiple bypass caps to reject different frequencies of noise. The 0.1- $\mu\text{F}$  and 1- $\mu\text{F}$  capacitors are commonly used in parallel. The bypass capacitor should be installed as close to the power terminal as possible for best results.

## 9 Layout

### 9.1 Layout Guidelines

When using multiple-input and multiple-channel logic devices inputs must not ever be left floating. In many cases, functions or parts of functions of digital logic devices are unused; for example, when only two inputs of a triple-input AND gate are used or only 3 of the 4 buffer gates are used. Such unused input pins must not be left unconnected because the undefined voltages at the outside connections result in undefined operational states. All unused inputs of digital logic devices must be connected to a logic high or logic low voltage, as defined by the input voltage specifications, to prevent them from floating. The logic level that must be applied to any particular unused input depends on the function of the device. Generally, the inputs are tied to GND or  $V_{CC}$ , whichever makes more sense for the logic function or is more convenient.



## 10 Device and Documentation Support

TI offers an extensive line of development tools. Tools and software to evaluate the performance of the device, generate code, and develop solutions are listed below.

### 10.1 Receiving Notification of Documentation Updates

To receive notification of documentation updates, navigate to the device product folder on [ti.com](https://www.ti.com). Click on *Subscribe to updates* to register and receive a weekly digest of any product information that has changed. For change details, review the revision history included in any revised document.

### 10.2 サポート・リソース

[TI 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、該当する貢献者により、現状のまま提供されるものです。これらは TI の仕様を構成するものではなく、必ずしも TI の見解を反映したものではありません。TI の[使用条件](#)を参照してください。

### 10.3 Trademarks

TI E2E™ is a trademark of Texas Instruments.

すべての商標は、それぞれの所有者に帰属します。

### 10.4 Electrostatic Discharge Caution



This integrated circuit can be damaged by ESD. Texas Instruments recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage.

ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

### 10.5 Glossary

[TI Glossary](#) This glossary lists and explains terms, acronyms, and definitions.

## 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.

**PACKAGING INFORMATION**

| Orderable Device | Status<br>(1) | Package Type | Package Drawing | Pins | Package 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                 |
|------------------|---------------|--------------|-----------------|------|-------------|------------------|--------------------------------------|----------------------|--------------|------------------------------------|-------------------------|
| 5962-86818012A   | ACTIVE        | LCCC         | FK              | 20   | 55          | Non-RoHS & Green | SNPB                                 | N / A for Pkg Type   | -55 to 125   | 5962-86818012A<br>SNJ54HC<br>688FK | <a href="#">Samples</a> |
| 5962-8681801RA   | ACTIVE        | CDIP         | J               | 20   | 20          | Non-RoHS & Green | SNPB                                 | N / A for Pkg Type   | -55 to 125   | 5962-8681801RA<br>SNJ54HC688J      | <a href="#">Samples</a> |
| SN54HC688J       | ACTIVE        | CDIP         | J               | 20   | 20          | Non-RoHS & Green | SNPB                                 | N / A for Pkg Type   | -55 to 125   | SN54HC688J                         | <a href="#">Samples</a> |
| SN74HC688DW      | OBSOLETE      | SOIC         | DW              | 20   |             | TBD              | Call TI                              | Call TI              | -40 to 85    | HC688                              |                         |
| SN74HC688DWR     | ACTIVE        | SOIC         | DW              | 20   | 2000        | RoHS & Green     | NIPDAU                               | Level-1-260C-UNLIM   | -40 to 85    | HC688                              | <a href="#">Samples</a> |
| SN74HC688DWRE4   | ACTIVE        | SOIC         | DW              | 20   | 2000        | RoHS & Green     | NIPDAU                               | Level-1-260C-UNLIM   | -40 to 85    | HC688                              | <a href="#">Samples</a> |
| SN74HC688DWRG4   | ACTIVE        | SOIC         | DW              | 20   | 2000        | RoHS & Green     | NIPDAU                               | Level-1-260C-UNLIM   | -40 to 85    | HC688                              | <a href="#">Samples</a> |
| SN74HC688N       | ACTIVE        | PDIP         | N               | 20   | 20          | RoHS & Green     | NIPDAU                               | N / A for Pkg Type   | -40 to 85    | SN74HC688N                         | <a href="#">Samples</a> |
| SN74HC688PWR     | ACTIVE        | TSSOP        | PW              | 20   | 2000        | RoHS & Green     | NIPDAU                               | Level-1-260C-UNLIM   | -40 to 85    | HC688                              | <a href="#">Samples</a> |
| SN74HC688PWRE4   | ACTIVE        | TSSOP        | PW              | 20   | 2000        | RoHS & Green     | NIPDAU                               | Level-1-260C-UNLIM   | -40 to 85    | HC688                              | <a href="#">Samples</a> |
| SN74HC688PWT     | OBSOLETE      | TSSOP        | PW              | 20   |             | TBD              | Call TI                              | Call TI              | -40 to 85    | HC688                              |                         |
| SNJ54HC688FK     | ACTIVE        | LCCC         | FK              | 20   | 55          | Non-RoHS & Green | SNPB                                 | N / A for Pkg Type   | -55 to 125   | 5962-86818012A<br>SNJ54HC<br>688FK | <a href="#">Samples</a> |
| SNJ54HC688J      | ACTIVE        | CDIP         | J               | 20   | 20          | Non-RoHS & Green | SNPB                                 | N / A for Pkg Type   | -55 to 125   | 5962-8681801RA<br>SNJ54HC688J      | <a href="#">Samples</a> |

(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  $\leq 1000$ ppm threshold. Antimony trioxide based flame retardants must also meet the  $\leq 1000$ ppm threshold requirement.

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

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

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

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

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**OTHER QUALIFIED VERSIONS OF SN54HC688, SN74HC688 :**

● Catalog : [SN74HC688](#)

● Military : [SN54HC688](#)

NOTE: Qualified Version Definitions:

● Catalog - TI's standard catalog product

● Military - QML certified for Military and Defense Applications

**TAPE AND REEL INFORMATION**

**QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE**


\*All dimensions are nominal

| Device       | Package Type | Package Drawing | Pins | SPQ  | Reel Diameter (mm) | Reel Width W1 (mm) | A0 (mm) | B0 (mm) | K0 (mm) | P1 (mm) | W (mm) | Pin1 Quadrant |
|--------------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| SN74HC688DWR | SOIC         | DW              | 20   | 2000 | 330.0              | 24.4               | 10.9    | 13.3    | 2.7     | 12.0    | 24.0   | Q1            |
| SN74HC688PWR | TSSOP        | PW              | 20   | 2000 | 330.0              | 16.4               | 6.95    | 7.0     | 1.4     | 8.0     | 16.0   | Q1            |
| SN74HC688PWR | TSSOP        | PW              | 20   | 2000 | 330.0              | 16.4               | 6.95    | 7.0     | 1.4     | 8.0     | 16.0   | Q1            |

## TAPE AND REEL BOX DIMENSIONS



\*All dimensions are nominal

| Device       | Package Type | Package Drawing | Pins | SPQ  | Length (mm) | Width (mm) | Height (mm) |
|--------------|--------------|-----------------|------|------|-------------|------------|-------------|
| SN74HC688DWR | SOIC         | DW              | 20   | 2000 | 367.0       | 367.0      | 45.0        |
| SN74HC688PWR | TSSOP        | PW              | 20   | 2000 | 356.0       | 356.0      | 35.0        |
| SN74HC688PWR | TSSOP        | PW              | 20   | 2000 | 356.0       | 356.0      | 35.0        |

**TUBE**


\*All dimensions are nominal

| Device         | Package Name | Package Type | Pins | SPQ | L (mm) | W (mm) | T (μm) | B (mm) |
|----------------|--------------|--------------|------|-----|--------|--------|--------|--------|
| 5962-86818012A | FK           | LCCC         | 20   | 55  | 506.98 | 12.06  | 2030   | NA     |
| SN74HC688N     | N            | PDIP         | 20   | 20  | 506    | 13.97  | 11230  | 4.32   |
| SNJ54HC688FK   | FK           | LCCC         | 20   | 55  | 506.98 | 12.06  | 2030   | NA     |

PW0020A



# PACKAGE OUTLINE

## TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE



4220206/A 02/2017

# EXAMPLE BOARD LAYOUT

PW0020A

TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE



LAND PATTERN EXAMPLE  
EXPOSED METAL SHOWN  
SCALE: 10X



SOLDER MASK DETAILS

4220206/A 02/2017

NOTES: (continued)

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



# EXAMPLE STENCIL DESIGN

PW0020A

TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE



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

4220206/A 02/2017

NOTES: (continued)

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

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

14 LEADS SHOWN

# CERAMIC DUAL IN-LINE PACKAGE



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

## GENERIC PACKAGE VIEW

**FK 20**

**LCCC - 2.03 mm max height**

8.89 x 8.89, 1.27 mm pitch

LEADLESS CERAMIC CHIP CARRIER

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



4229370VA\

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

PLASTIC DUAL-IN-LINE PACKAGE

16 PINS SHOWN



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

# DW0020A



# PACKAGE OUTLINE

## SOIC - 2.65 mm max height

SOIC



4220724/A 05/2016

**NOTES:**

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

# EXAMPLE BOARD LAYOUT

DW0020A

SOIC - 2.65 mm max height

SOIC



LAND PATTERN EXAMPLE  
SCALE:6X



SOLDER MASK DETAILS

4220724/A 05/2016

NOTES: (continued)

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

# EXAMPLE STENCIL DESIGN

DW0020A

SOIC - 2.65 mm max height

SOIC



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

4220724/A 05/2016

NOTES: (continued)

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

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