

# LM95071 SPI/MICROWIRE 13ビット+符号温度センサ

## 1 特長

- 小型の SOT-23 パッケージによる省スペース
- シャットダウン・モードで温度読み取り間での電力を削減
- 40°C～+150°C の温度範囲の全体で動作
- SPI および MICROWIRE バス・インターフェイス
- 主な仕様
  - 電源電圧: 2.4V～5.5V
  - 消費電流
    - 動作時: 280μA (標準値)
    - シャットダウン時: 6μA (標準値)
  - 温度精度
    - 0°C～70°C: ±1°C (最大値)
    - 40°C～150°C: ±2°C (最大値)
  - 温度分解能: 0.03125°C

## 2 アプリケーション

- システムの熱管理
- 携帯用電子機器
- パーソナル・コンピュータ
- ディスク・ドライブ
- オフィス用電子機器
- 電子機器の試験装置

## 3 概要

LM95071は低消費電力、高分解能のデジタル温度センサであり、SPIおよびMICROWIRE互換のインターフェイスが搭載され、5ピンのSOT-23パッケージで供給されます。ホストは随时LM95071を照会して、温度を読み取ることができます。動作電流が小さいため、低消費電力が重要なシステムに適しています。

LM95071は、13ビット+符号の温度分解能(0.03125°C/LSB)を持ち、-40°C～+150°Cの温度範囲で動作します。

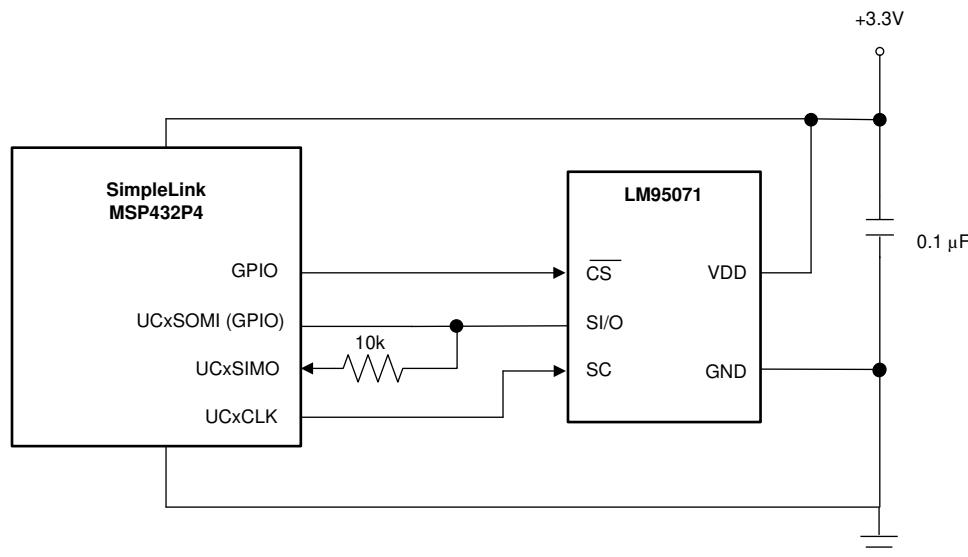
LM95071は2.4V～5.5Vの電源電圧範囲で動作し、変換速度が高く、消費電流が小さく、単純なSPIインターフェイスを搭載しているため、広範なアプリケーションに理想的です。

### 製品情報<sup>(1)</sup>

型番	パッケージ	本体サイズ(公称)
LM95071	SOT-23 (5)	2.90mm×1.60mm

(1) 提供されているすべてのパッケージについては、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。

### 温度監視アプリケーション



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## 4 改訂履歴

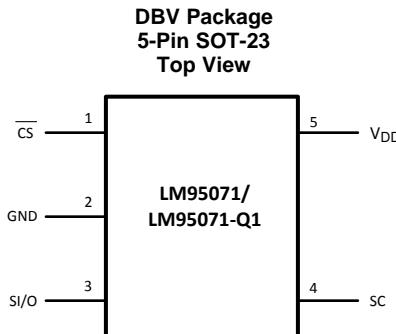
資料番号末尾の英字は改訂を表しています。その改訂履歴は英語版に準じています。

Revision F (May 2019) から Revision G に変更	Page
• 「温度監視アプリケーション」図を変更 .....	1

Revision E (December 2018) から Revision F に変更	Page
• Added the TYPE column to the Pin Functions table .....	3
• Changed V <sub>(ESD)</sub> for CDM from $\pm 200$ V to $\pm 250$ V .....	3

Revision D (September 2013) から Revision E に変更	Page
• データシートのレイアウトを最新の SDS フォーマットに更新 .....	1
• 車載用デバイスを単独のデータシート (SNIS207) に移行 .....	1
• 「製品情報」表、「ESD 定格」表、「機能説明」セクション、「デバイスの機能モード」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
• 先頭ページのキー・グラフィックを変更 .....	1
• Replaced the Thermal Characteristics table with the Thermal Information table and added new thermal resistance values .....	4
• Changed Temperature-to-Digital Converter Characteristics tablenote to clarify conversion interval .....	4

## 5 Pin Configuration and Functions



### Pin Function

PIN		TYPE	DESCRIPTION
NO.	NAME		
1	CS	Input	Chip Select input. This pin receives an active-low signal from the controller to select the device.
2	GND	Ground	Ground. This is the power and signal ground return.
3	SI/O	Input/Output	Serial Input/Output. This serial, bidirectional, data bus pin transmits and receives signals to and from the controller. Schmitt trigger input in the input mode.
4	SC	Input	Serial bus clock. This serial clock signal comes from the controller. Schmitt trigger input.
5	V <sub>DD</sub>	Supply	Positive Supply Voltage. Supply a DC voltage from 2.4V to 5.5V to this pin and bypass with a 0.1- $\mu$ F ceramic capacitor to ground.

## 6 Specifications

### 6.1 Absolute Maximum Ratings <sup>(1)(2)(3)</sup>

	MIN	MAX	UNIT
Supply voltage	-0.3	6	V
Voltage at any pin	-0.3	V <sub>DD</sub> + 0.3	V
Input current at any pin <sup>(4)</sup>	5		mA
Storage temperature, T <sub>stg</sub>	-65	150	°C

- (1) Absolute Maximum Ratings indicate limits beyond which damage to the device may occur. DC and AC electrical specifications do not apply when operating the device beyond its rated operating conditions.
- (2) Soldering process must comply with Reflow Temperature Profile specifications. Refer to <http://www.ti.com/packaging>.
- (3) Reflow temperature profiles are different for lead-free and non-lead-free packages.
- (4) When the input voltage (V<sub>I</sub>) at any pin exceeds the power supplies (V<sub>I</sub> < GND or V<sub>I</sub> > V<sub>DD</sub>) the current at that pin should be limited to 5 mA.

### 6.2 ESD Ratings

		VALUE	UNIT
V <sub>(ESD)</sub>	Electrostatic discharge	Human-body model (HBM), per ANSI/ESDA/JEDEC JS-001 <sup>(1)(2)</sup>	±2000 ±250
		Charged-device model (CDM), per JEDEC specification JESD22-C101 <sup>(3)</sup>	

- (1) JEDEC document JEP155 states that 500-V HBM allows safe manufacturing with a standard ESD control process.
- (2) Human body model, 100 pF discharged through a 1.5 k $\Omega$  resistor. Machine model, 200 pF discharged directly into each pin.
- (3) JEDEC document JEP157 states that 250-V CDM allows safe manufacturing with a standard ESD control process.

## 6.3 Recommended Operating Ratings

	<b>MIN</b>	<b>MAX</b>	<b>UNIT</b>
Specified temperature <sup>(1)</sup> , $T_{MIN}$ to $T_{MAX}$	-40	150	°C
Supply voltage ( $V_{DD}$ )	2.4	5.5	V

(1) The life expectancy of the LM95071 will be reduced when operating at elevated temperatures. of the LM95071  $\theta_{JA}$  (thermal resistance, junction-to-ambient) when attached to a printed-circuit board with 2-oz. foil is summarized in the table below.

## 6.4 Thermal Information

<b>THERMAL METRIC<sup>(1)</sup></b>		<b>LM95071</b>	<b>UNIT</b>
		<b>DBV (SOT-23)</b>	
		<b>5 PINS</b>	
$R_{\theta JA}$	Junction-to-ambient thermal resistance	167.2	°C/W
$R_{\theta JC(\text{top})}$	Junction-to-case (top) thermal resistance	118.8	°C/W
$R_{\theta JB}$	Junction-to-board thermal resistance	30.7	°C/W
$\psi_{JT}$	Junction-to-top characterization parameter	14.4	°C/W
$\psi_{JB}$	Junction-to-board characterization parameter	30.1	°C/W
$R_{\theta JC(\text{bot})}$	Junction-to-case (bottom) thermal resistance	n/a	°C/W

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

## 6.5 Temperature-to-Digital Converter Characteristics

Unless otherwise noted, these specifications apply for  $V_{DD} = 3.3$  V. All limits  $T_A = T_J = +25$  °C, unless otherwise noted.

<b>PARAMETER</b>	<b>TEST CONDITIONS</b>		<b>MIN<sup>(1)</sup></b>	<b>TYP<sup>(2)</sup></b>	<b>MAX<sup>(1)</sup></b>	<b>UNIT</b>
Temperature error <sup>(3)</sup>	$V_{DD} = 3.0$ V to 3.6 V; $T_A = 0$ °C to $+70$ °C, $T_A = T_J = T_{MIN}$ to $T_{MAX}$				$\pm 1.0$	°C
	$V_{DD} = 3.0$ V to 3.6 V; $T_A = -40$ °C to $+150$ °C, $T_A = T_J = T_{MIN}$ to $T_{MAX}$				$\pm 2.0$	°C
Line regulation	$V_{DD} = 3.6$ V to 5.5 V; $T_A = 0$ °C to $+70$ °C				$+0.3$	°C/V
	$V_{DD} = 3.0$ V to 2.4 V; $T_A = 0$ °C to $+70$ °C				-0.6	
Resolution			14	0.03125		Bits °C
Temperature conversion time	See <sup>(4)</sup>	$T_A = T_J = +25$ °C		130		ms
		$T_A = T_J = T_{MIN}$ to $T_{MAX}$			228	
Quiescent current	Operating, serial bus inactive	$T_A = T_J = +25$ °C		280		μA
		$T_A = T_J = T_{MIN}$ to $T_{MAX}$			520	
	Shutdown	$T_A = T_J = +25$ °C		6		μA
		$T_A = T_J = T_{MIN}$ to $T_{MAX}$			28	

(1) Limits are guaranteed to TI's AOQL (Average Outgoing Quality Level).  
(2) Typicals are at  $T_A = 25$  °C and represent most likely parametric norm.  
(3) The of the LM95071 will operate properly over the  $V_{DD}$  supply voltage range of 2.4V to 5.5V.  
(4) Following a power on reset, the user must allow at least 228 ms before making the first read transaction to ensure a first valid temperature read. After the first read, in order to ensure an accurate temperature result, the time interval between any two consecutive temperature reads must be greater than the maximum conversion time of 228 ms.

## 6.6 Logic Electrical Characteristics - Digital DC Characteristics

Unless otherwise noted, these specifications apply for  $V_{DD} = 2.4$  V to 5.5 V<sup>(1)</sup>.

<b>PARAMETER</b>	<b>TEST CONDITIONS</b>		<b>MIN<sup>(2)</sup></b>	<b>TYP<sup>(3)</sup></b>	<b>MAX<sup>(2)</sup></b>	<b>UNIT</b>
$V_{IN(1)}$	Logical "1" Input Voltage	$T_A = T_J = T_{MIN}$ to $T_{MAX}$	$0.7 \times V_{DD}$		$V_{DD} + 0.3$	V
$V_{IN(0)}$	Logical "0" Input Voltage	$T_A = T_J = T_{MIN}$ to $T_{MAX}$	-0.3		$0.3 \times V_{DD}$	V

(1) The of the LM95071 will operate properly over the  $V_{DD}$  supply voltage range of 2.4V to 5.5V.  
(2) Limits are guaranteed to TI's AOQL (Average Outgoing Quality Level).  
(3) Typicals are at  $T_A = 25$  °C and represent most likely parametric norm.

## Logic Electrical Characteristics - Digital DC Characteristics (continued)

Unless otherwise noted, these specifications apply for  $V_{DD} = 2.4\text{ V to }5.5\text{ V}^{(1)}$ .

PARAMETER	TEST CONDITIONS	MIN <sup>(2)</sup>	TYP <sup>(3)</sup>	MAX <sup>(2)</sup>	UNIT
Input Hysteresis Voltage	$V_{DD} = 3\text{ V to }3.6\text{ V}$	$T_A = T_J = +25^\circ\text{C}$	0.4		V
		$T_A = T_J = T_{MIN} \text{ to } T_{MAX}$	0.33		
$I_{IN(1)}$ Logical "1" Input Current	$V_{IN} = V_{DD}$	$T_A = T_J = +25^\circ\text{C}$	0.005		$\mu\text{A}$
		$T_A = T_J = T_{MIN} \text{ to } T_{MAX}$		3	
$I_{IN(0)}$ Logical "0" Input Current	$V_{IN} = 0\text{ V}$	$T_A = T_J = +25^\circ\text{C}$	-0.005		$\mu\text{A}$
		$T_A = T_J = T_{MIN} \text{ to } T_{MAX}$	-3		
$C_{IN}$	All Digital Inputs	$T_A = T_J = +25^\circ\text{C}$		20	$\text{pF}$
$V_{OH}$	High Level Output Voltage	$I_{OH} = -400\text{ }\mu\text{A}, T_A = T_J = T_{MIN} \text{ to } T_{MAX}$	2.25		V
$V_{OL}$	Low Level Output Voltage	$I_{OL} = +1.6\text{ mA}, T_A = T_J = T_{MIN} \text{ to } T_{MAX}$		0.4	V
$I_{O\_TRI-STATE}$ Output Leakage Current	$V_O = \text{GND}$ $V_O = V_{DD}, T_A = T_J = T_{MIN} \text{ to } T_{MAX}$		-1	+1	$\mu\text{A}$

## 6.7 Logic Electrical Characteristics - Serial Bus Digital Switching Characteristics

Unless otherwise noted, these specifications apply for  $V_{DD} = 2.4\text{ V to }5.5\text{ V}^{(1)}$ ;  $C_L$  (load capacitance) on output lines = 100 pF unless otherwise specified.

		MIN <sup>(2)</sup>	TYP <sup>(3)</sup>	MAX <sup>(2)</sup>	UNIT
$t_1$	SC (Clock) Period	$T_A = T_J = T_{MIN} \text{ to } T_{MAX}$		0.16	$\mu\text{s}$
		$T_A = T_J = +25^\circ\text{C}$		DC	
$t_2$	$\overline{CS}$ Low to SC (Clock) High Set-Up Time	$T_A = T_J = T_{MIN} \text{ to } T_{MAX}$	100		ns
$t_3$	$\overline{CS}$ Low to Data Out (SO) Delay	$T_A = T_J = T_{MIN} \text{ to } T_{MAX}$		70	ns
$t_4$	SC (Clock) Low to Data Out (SO) Delay	$T_A = T_J = T_{MIN} \text{ to } T_{MAX}$		70	ns
$t_5$	$\overline{CS}$ High to Data Out (SO) TRI-STATE	$T_A = T_J = T_{MIN} \text{ to } T_{MAX}$		200	ns
$t_6$	SC (Clock) High to Data In (SI) Hold Time	$T_A = T_J = T_{MIN} \text{ to } T_{MAX}$	50		ns
$t_7$	Data In (SI) Set-Up Time to SC (Clock) High	$T_A = T_J = T_{MIN} \text{ to } T_{MAX}$	30		ns
$t_8$	SC (Clock) High to $\overline{CS}$ High Hold Time	$T_A = T_J = T_{MIN} \text{ to } T_{MAX}$	50		ns

(1) The of the LM95071 will operate properly over the  $V_{DD}$  supply voltage range of 2.4V to 5.5V.

(2) Limits are guaranteed to TI's AOQL (Average Outgoing Quality Level).

(3) Typicals are at  $T_A = 25^\circ\text{C}$  and represent most likely parametric norm.

## 6.8 Timing Diagrams

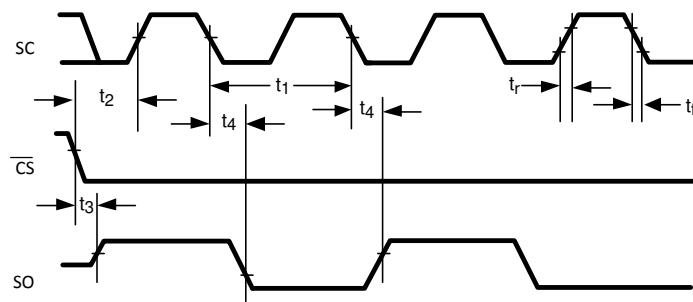
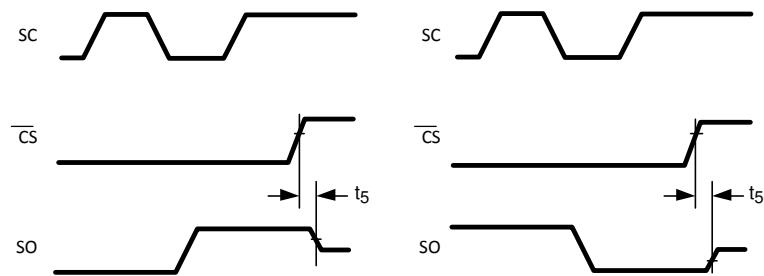
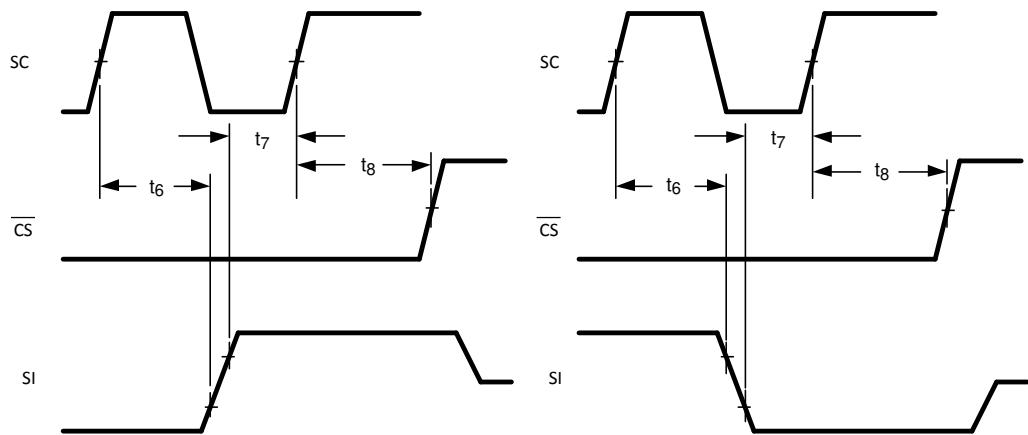


Figure 1. Data Output Timing Diagram

## Timing Diagrams (continued)



**Figure 2. TRI-STATE Data Output Timing Diagram**



**Figure 3. Data Input Timing Diagram**

## 6.9 Typical Characteristics

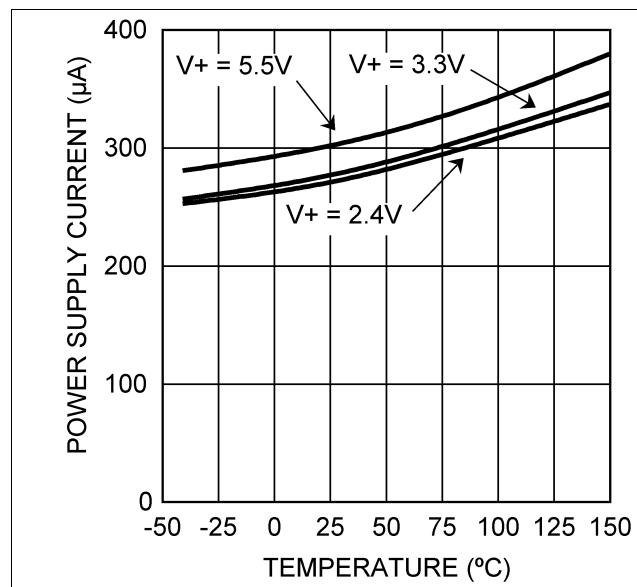


Figure 4. Static Supply Current vs. Temperature

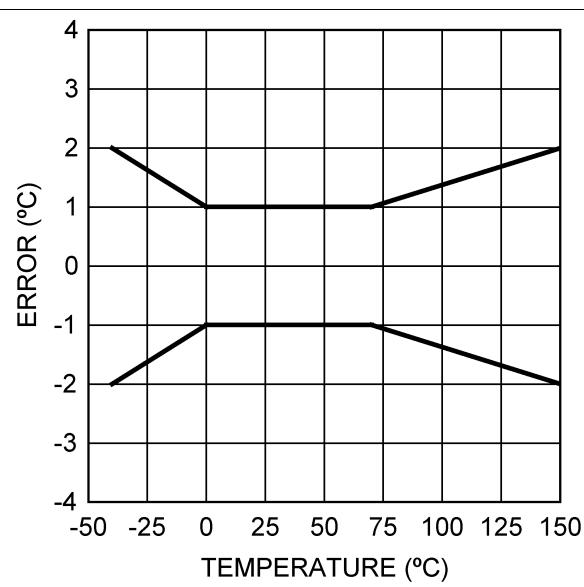


Figure 5. Maximum Temperature Error

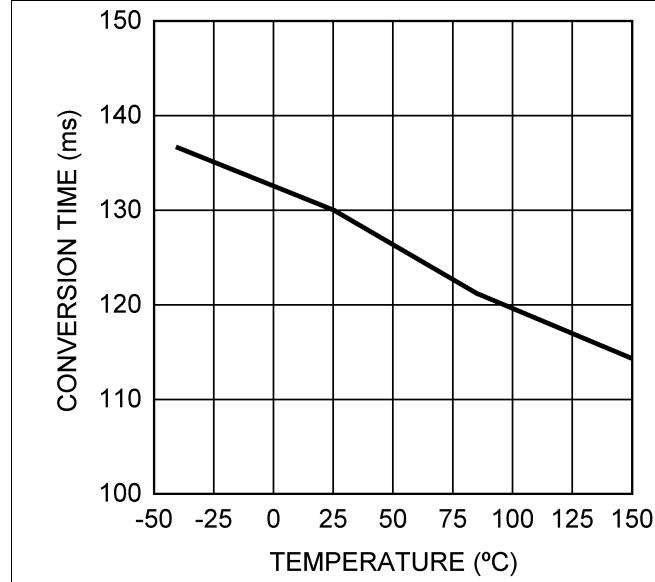


Figure 6. Conversion Time vs Temperature

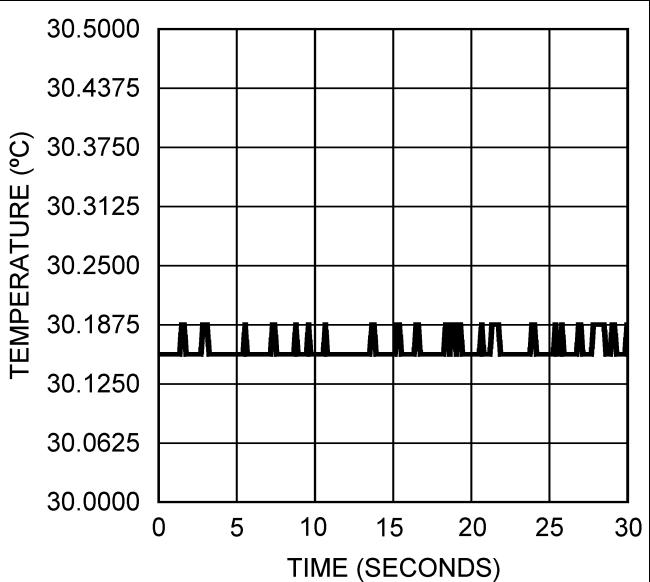
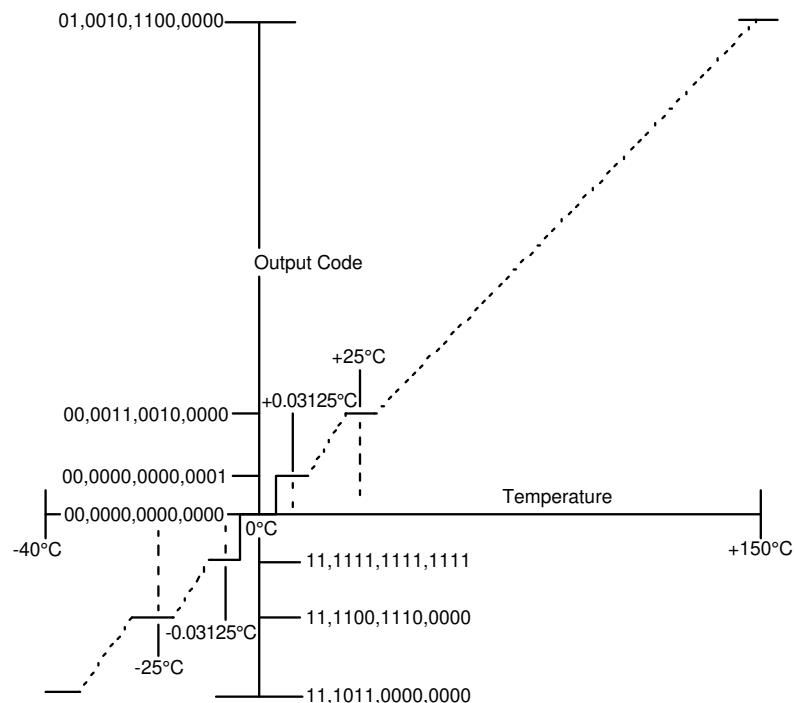
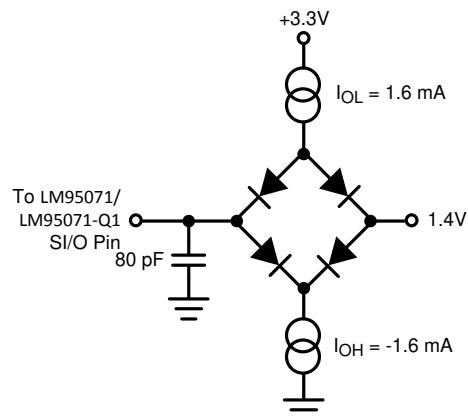


Figure 7. Typical Output Noise at 30°C

## 7 Parameter Measurement Information



**Figure 8. Temperature-to-Digital Transfer Function (Non-Linear Scale for Clarity)**



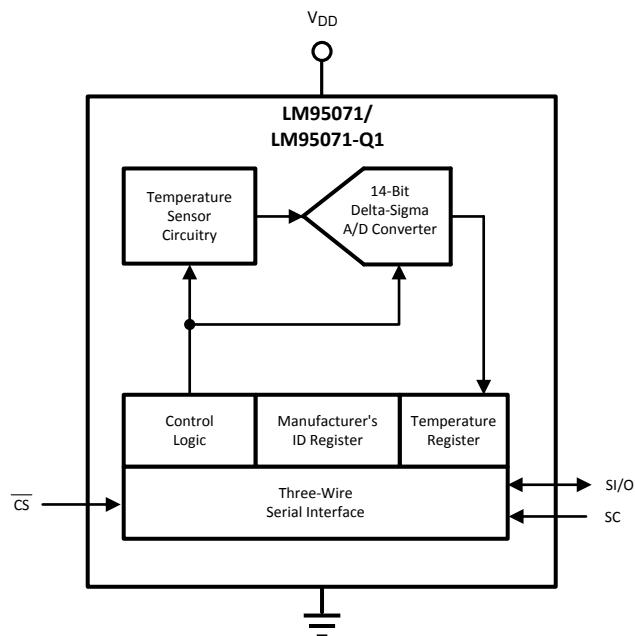
**Figure 9. TRI-STATE Test Circuit**

## 8 Detailed Description

### 8.1 Overview

The LM95071 temperature sensor incorporates a temperature sensor and 13-bit-plus-sign  $\Delta\Sigma$  ADC (Delta-Sigma Analog-to-Digital Converter). Compatibility of the LM95071's three-wire serial interface with SPI and MICROWIRE allows simple communications with common microcontrollers and processors. Shutdown mode can be used to optimize current drain for different applications. A Manufacturer/Device ID register identifies the LM95071 as a Texas Instruments product.

### 8.2 Functional Block Diagram



### 8.3 Feature Description

#### 8.3.1 Power Up and Power Down

The LM95071 always powers up in a known state and in the continuous conversion mode. Immediately after power up, the LM95071 will output an erroneous code until the first temperature conversion has completed.

When the supply voltage is less than about 1.6V (typical), the LM95071 is considered powered down. As the supply voltage rises above the nominal 1.6-V power up threshold, the internal registers are reset to the power up default state described above.

#### 8.3.2 Temperature Data Format

Temperature data is represented by a 14-bit, two's complement word with an LSB (Least Significant Bit) equal to 0.03125°C:

**Table 1. Digital Output for Temperature Data**

Temperature	Digital Output	
	Binary	Hex
+150°C	0100 1011 0000 0011	4B03
+125°C	0011 1110 1000 0011	3E83
+25°C	0000 1100 1000 0011	0C83
+0.03125°C	0000 0000 0000 0111	0007
0°C	0000 0000 0000 0011	0003

**Table 1. Digital Output for Temperature Data (continued)**

Temperature	Digital Output	
	Binary	Hex
-0.03125°C	1111 1111 1111 1111	FFFF
-25°C	1111 0011 1000 0011	F383
-40°C	1110 1100 0000 0011	EC03

The first data byte is the most significant byte with most significant bit first, permitting only as much data as necessary to be read to determine temperature condition. For instance, if the first four bits of the temperature data indicate an overtemperature condition, the host processor could immediately take action to remedy the excessive temperatures.

### 8.3.3 Tight Accuracy, Fine Resolution and Low Noise

The LM95071 is well suited for applications that require tight temperature measurement accuracy. In many applications, from process control to HVAC, the low temperature error can mean better system performance and, by eliminating a system calibration step, lower production cost.

With fine digital resolution, the LM95071 senses and reports very small changes in its temperature, making it ideal for applications where temperature sensitivity is important. For example, the LM95071 enables the system to quickly identify the direction of temperature change, allowing the processor to take compensating action before the system reaches a critical temperature.

The LM95071 has very low output noise (see [Figure 7](#) in the *Typical Characteristics* section), which makes it ideal for applications where stable thermal compensation is a priority. For example, in a temperature-compensated oscillator application, the very small deviation in successive temperature readings translates to a stable frequency output from the oscillator.

## 8.4 Device Functional Modes

### 8.4.1 Shutdown Mode/Manufacturer ID

The master controller may enable the shutdown mode for the purpose of reducing power consumption or for reading the Manufacturer/Device ID information. The shutdown mode is enabled by writing XX FF hex to the LM95071 as shown in [Figure 13c](#). The serial bus is still active when the LM95071 is in shutdown. When in shutdown mode the LM95071 always will output 1000 0000 0000 1111. This is the Manufacturer/Device ID information. The first 5-bits of the field (1000 0XXX) are reserved for the manufacturer ID.

## 8.5 Programming

### 8.5.1 Serial Bus Interface

The LM95071 operates as a slave and is compatible with SPI or MICROWIRE bus specifications. Data is clocked out on the falling edge of the serial clock (SC), while data is clocked in on the rising edge of SC. A complete communication is framed by falling and rising chip select (CS) signal. The CS signal should be held high for at least one clock cycle (160 ns minimum) between communications. The transmit-only communication (register read) consists of 16 clock cycles. A complete transmit/receive communication will consist of 32 serial clocks (see [Serial Bus Timing Diagrams](#)). The first 16 clocks comprise the transmit phase of communication, while the second 16 clocks are the receive phase.

When  $\overline{CS}$  is high SI/O will be in TRI-STATE. Communication should be initiated by taking chip select ( $\overline{CS}$ ) low. This should not be done when SC is changing from a low to high state. Once  $\overline{CS}$  is low the serial I/O pin (SI/O) will transmit the first bit of data. The master can then read this bit with the rising edge of SC. The remainder of the data will be clocked out by the falling edge of SC.  $\overline{CS}$  can be taken high at any time during the transmit phase. If  $\overline{CS}$  is brought low in the middle of a conversion the LM95071 will complete the conversion and the output shift register will be updated after  $\overline{CS}$  is brought back high.

## Programming (continued)

The receive phase of a communication starts after 16 SC periods.  $\overline{CS}$  can remain low for 32 SC cycles. The LM95071/LM95071-Q1 will read the data available on the SI/O line on the rising edge of the serial clock. Input data is to an 8-bit shift register. The part will detect the last eight bits shifted into the register. The receive phase can last up to 16 SC periods. All ones must be shifted in order to place the part into shutdown. All zeros must be shifted in order to place the LM95071 into continuous conversion mode. Only the following codes should be transmitted to the LM95071:

- 00 hex for continuous conversion
- FF hex for shutdown

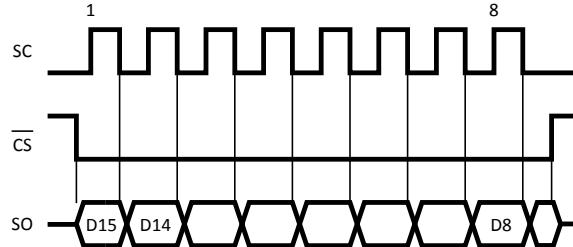
Another code may place the part into a test mode. Test modes are used by Texas Instruments to thoroughly test the function of the LM95071 during production testing. Only eight bits have been defined above since only the last eight transmitted are detected by the LM95071, before  $\overline{CS}$  is taken HIGH.

The following communication can be used to determine the Manufacturer's/Device ID and then immediately place the part into continuous conversion mode. With  $\overline{CS}$  continuously low:

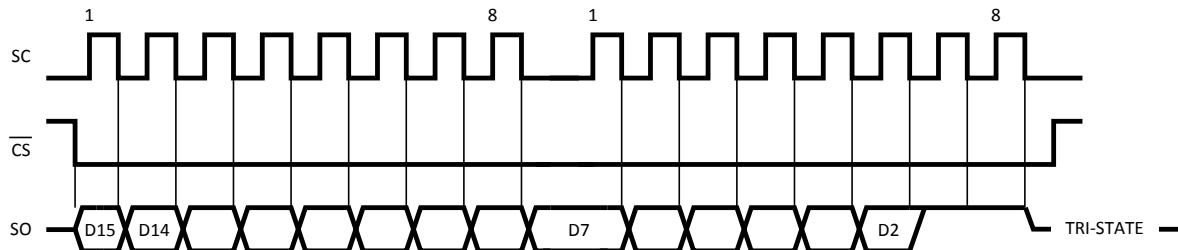
- Read 16 bits of temperature data
- Write 16 bits of data commanding shutdown
- Read 16 bits of Manufacturer's/Device ID data
- Write 8 to 16 bits of data commanding Conversion Mode
- Take  $\overline{CS}$  HIGH.

Note that 228 ms (max) will have to pass for a conversion to complete before the LM95071 actually transmits temperature data.

### 8.5.2 Serial Bus Timing Diagrams



**Figure 10. Reading Continuous Conversion - Single Eight-Bit Frame**



**Figure 11. Reading Continuous Conversion - Two Eight-Bit Frames**

## Programming (continued)

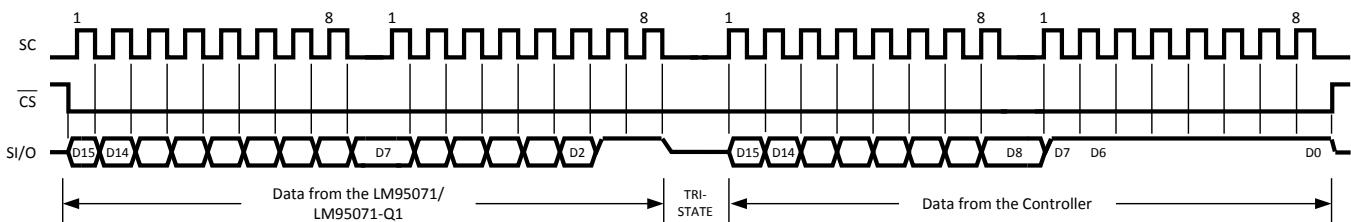


Figure 12. Writing Shutdown Mode

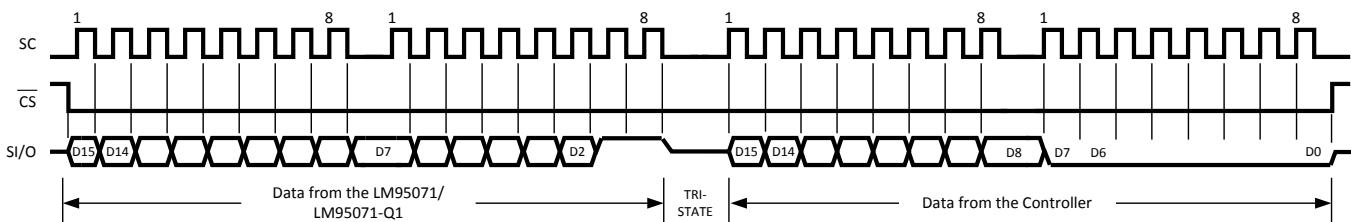


Figure 13. Writing Conversion Mode

## 8.6 Register Maps

### 8.6.1 Internal Register Structure

The LM95071 has three registers: the temperature register, the configuration register and the Manufacturer/Device identification register. The temperature and Manufacturer/Device identification registers are read only. The configuration register is write only.

#### 8.6.1.1 Configuration Register

(Selects shutdown or continuous conversion modes):

Table 2. (Write Only):

D15	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Shutdown

D0–D15 set to XX FF hex enables shutdown mode.

D0–D15 set to XX 00 hex sets continuous-conversion mode.

Note: setting D0–D15 to any other values may place the LM95071 into a manufacturer's test mode, upon which the LM95071 will stop responding as described. These test modes are to be used for Texas Instruments production testing only. See [Serial Bus Interface](#) for a complete discussion.

#### 8.6.1.2 Temperature Register

Table 3. (Read Only):

D15	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0
MSB	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	LSB	1	1

D0–D1: Logic 1 will be output on SI/0.

D2–D15: Temperature Data. One LSB = 0.03125°C. Two's complement format.

#### **8.6.1.3 Manufacturer/Device ID Register**

**Table 4. (Read Only):**

D15	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0
1	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1

D0–D1: Logic 1 will be output on SI/0.

D2–D15: Manufacturer/Device ID Data. This register is accessed whenever the LM95071 is in shutdown mode.

## 9 デバイスおよびドキュメントのサポート

### 9.1 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、ti.comのデバイス製品フォルダを開いてください。右上の「アラートを受け取る」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れます。変更の詳細については、修正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。

### 9.2 コミュニティ・リソース

The following links connect to TI community resources. Linked contents are provided "AS IS" by the respective contributors. They do not constitute TI specifications and do not necessarily reflect TI's views; see TI's [Terms of Use](#).

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**Design Support** *TI's Design Support* Quickly find helpful E2E forums along with design support tools and contact information for technical support.

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### 9.5 Glossary

[SLYZ022](#) — *TI Glossary.*

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

## 10 メカニカル、パッケージ、および注文情報

以降のページには、メカニカル、パッケージ、および注文に関する情報が記載されています。この情報は、そのデバイスについて利用可能な最新のデータです。このデータは予告なく変更されることがあります、ドキュメントが改訂される場合もあります。本データシートのブラウザ版を使用されている場合は、画面左側の説明をご覧ください。

**PACKAGING INFORMATION**

Orderable part number	Status (1)	Material type (2)	Package   Pins	Package qty   Carrier	RoHS (3)	Lead finish/ Ball material (4)	MSL rating/ Peak reflow (5)	Op temp (°C)	Part marking (6)
LM95071CIMF	NRND	Production	SOT-23 (DBV)   5	1000   SMALL T&R	No	SNPB	Level-1-260C-UNLIM	-40 to 150	T18C
LM95071CIMF.A	NRND	Production	SOT-23 (DBV)   5	1000   SMALL T&R	No	SNPB	Level-1-260C-UNLIM	-40 to 150	T18C
LM95071CIMF/NOPB	Obsolete	Production	SOT-23 (DBV)   5	-	-	Call TI	Call TI	-40 to 150	T18C
LM95071CIMFX	NRND	Production	SOT-23 (DBV)   5	3000   LARGE T&R	No	SNPB	Level-1-260C-UNLIM	-40 to 150	T18C
LM95071CIMFX.A	NRND	Production	SOT-23 (DBV)   5	3000   LARGE T&R	No	SNPB	Level-1-260C-UNLIM	-40 to 150	T18C
LM95071CIMFX/NOPB	Active	Production	SOT-23 (DBV)   5	3000   LARGE T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 150	T18C
LM95071CIMFX/NOPB.A	Active	Production	SOT-23 (DBV)   5	3000   LARGE T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 150	T18C

<sup>(1)</sup> **Status:** For more details on status, see our [product life cycle](#).

<sup>(2)</sup> **Material type:** When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, reliability performance testing, and/or process qualification, may not yet be complete, and this item is subject to further changes or possible discontinuation. If available for ordering, purchases will be subject to an additional waiver at checkout, and are intended for early internal evaluation purposes only. These items are sold without warranties of any kind.

<sup>(3)</sup> **RoHS values:** Yes, No, RoHS Exempt. See the [TI RoHS Statement](#) for additional information and value definition.

<sup>(4)</sup> **Lead finish/Ball material:** Parts 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.

<sup>(5)</sup> **MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.

<sup>(6)</sup> **Part marking:** There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

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

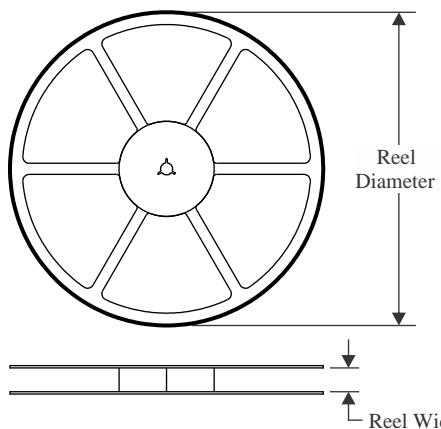
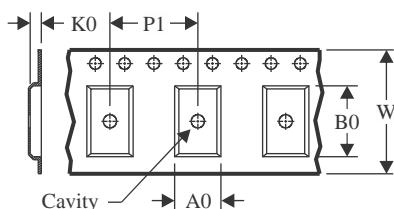
In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

**OTHER QUALIFIED VERSIONS OF LM95071 :**

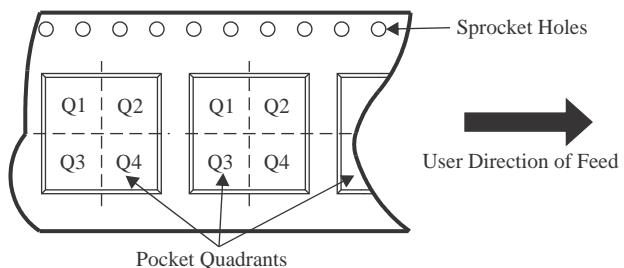
- Automotive : [LM95071-Q1](#)

## NOTE: Qualified Version Definitions:

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

**TAPE AND REEL INFORMATION**
**REEL DIMENSIONS**

**TAPE DIMENSIONS**


A0	Dimension designed to accommodate the component width
B0	Dimension designed to accommodate the component length
K0	Dimension designed to accommodate the component thickness
W	Overall width of the carrier tape
P1	Pitch between successive cavity centers

**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
LM95071CIMFX/NOPB	SOT-23	DBV	5	3000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3

**TAPE AND REEL BOX DIMENSIONS**


\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
LM95071CIMFX/NOPB	SOT-23	DBV	5	3000	208.0	191.0	35.0

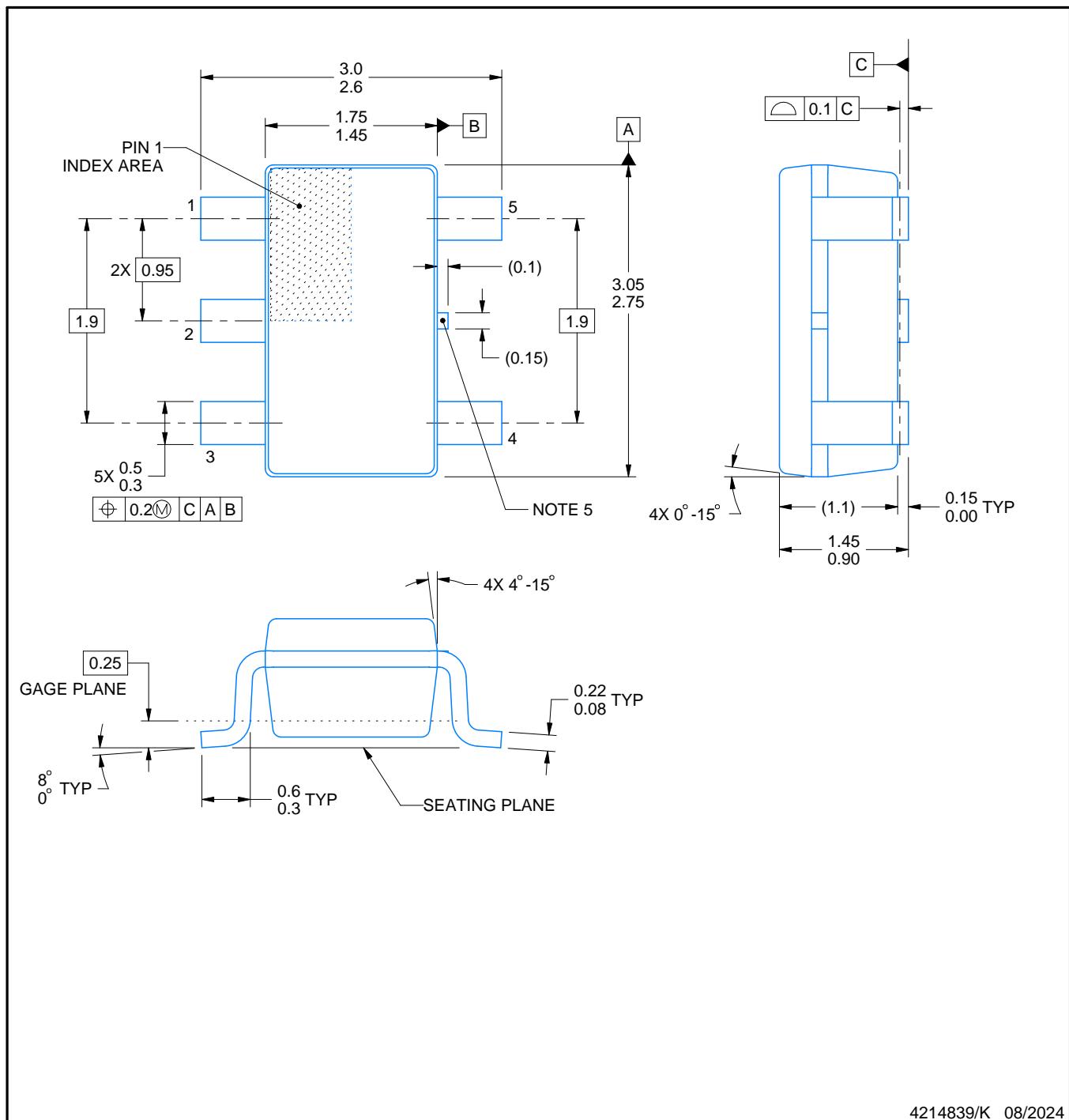
## PACKAGE OUTLINE

**DBV0005A**



## **SOT-23 - 1.45 mm max height**

## SMALL OUTLINE TRANSISTOR



4214839/K 08/2024

## NOTES:

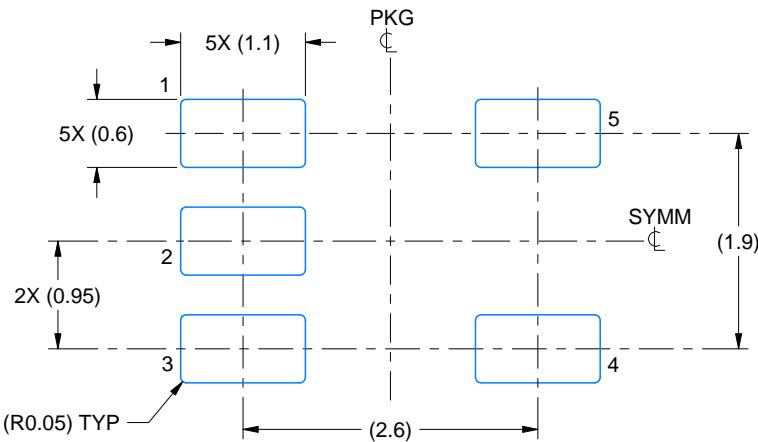
1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. Reference JEDEC MO-178.
4. Body dimensions do not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.25 mm per side.
5. Support pin may differ or may not be present.

# EXAMPLE BOARD LAYOUT

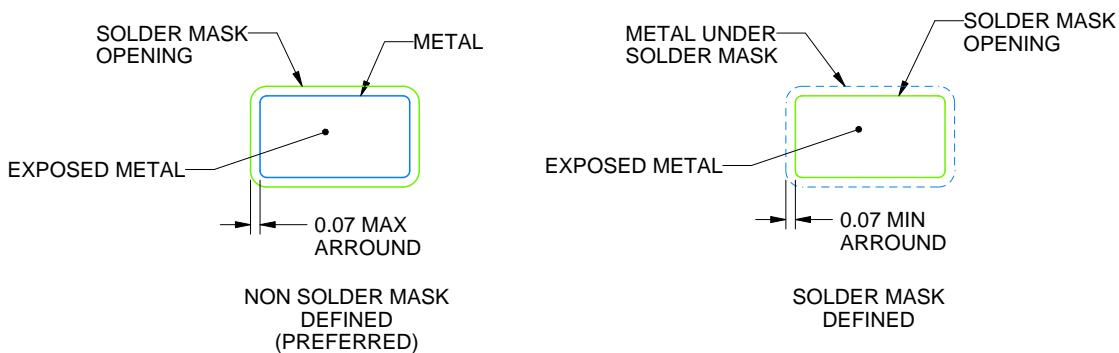
DBV0005A

SOT-23 - 1.45 mm max height

SMALL OUTLINE TRANSISTOR



LAND PATTERN EXAMPLE  
EXPOSED METAL SHOWN  
SCALE:15X



SOLDER MASK DETAILS

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NOTES: (continued)

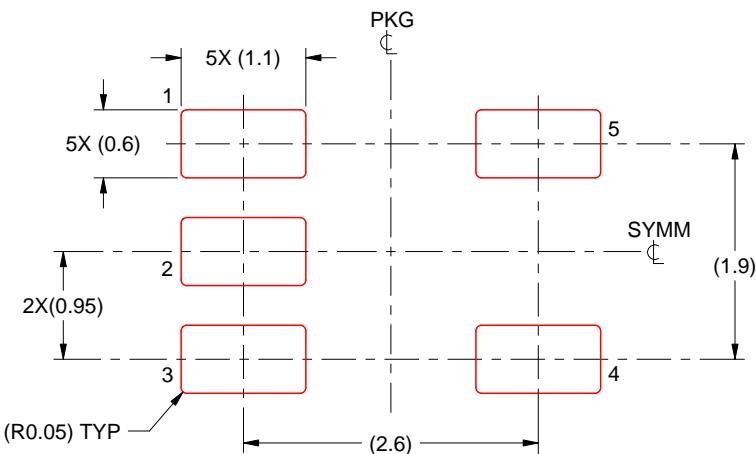
6. Publication IPC-7351 may have alternate designs.
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

# EXAMPLE STENCIL DESIGN

DBV0005A

SOT-23 - 1.45 mm max height

SMALL OUTLINE TRANSISTOR



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

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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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