TMP303 超小型パッケージに搭載した低消費電力、精度1°C、低電源電圧の使いやすい温度範囲モニタ

1 特長

- 低消費電流：5µA以下
- SOT-563パッケージ：1.60×1.60×0.6mm
- トリップ・ポイント精度：
  - ±0.2°C（標準値、-40°C～125°C）
- プッシュ - プル出力
- 選択可能なヒステリシス：1/2/5/10°C
- 電源電圧範囲：1.4V～3.6V

2 アプリケーション

- バッテリ充電
- バッテリの熱保護
- 消費者向け電子機器
- エンタープライズ
- 通信機器

3 概要

TMP303デバイスは、非常に小さなフットプリント(SOT-563)、小さな消費電流(5µA以下)、低い電源電圧への対応(最低1.4V)により、柔軟な設計が可能な温度範囲モニタです。

これらのデバイスを動作させるのに追加部品は不要です。マイクロプロセッサやマイクロコントローラと独立して動作できます。

7つのトリップ・ポイントを使用できます(デバイスのオプションを参照)。トリップ・ポイントは、出荷時に任意の温度にプログラム可能です。アプリケーションで別の値が必要な場合、お近くのTI代理店にお問い合わせください。

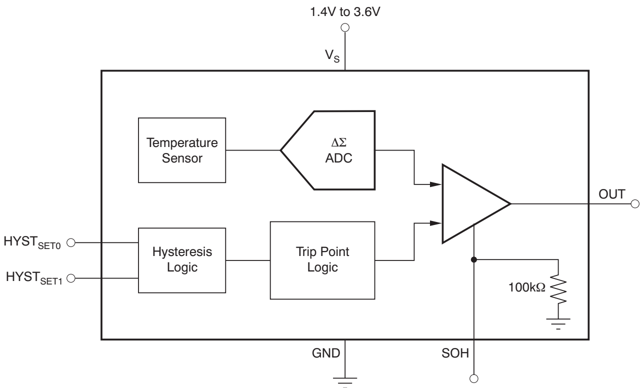
OUTピンはプッシュプル、アクティブHIGH出力です。Set Output High (SOH)ピンがLOWで、かつ測定温度がトリップ・ポイントの範囲を超えた場合、OUTピンがHIGHになります。SOHピンは入力ピンで、内部にプルダウン抵抗があります。SOHピンを強制的にHIGHにすると、測定された温度にかかわらず、OUTピンがHIGHになります。

製品情報(1)

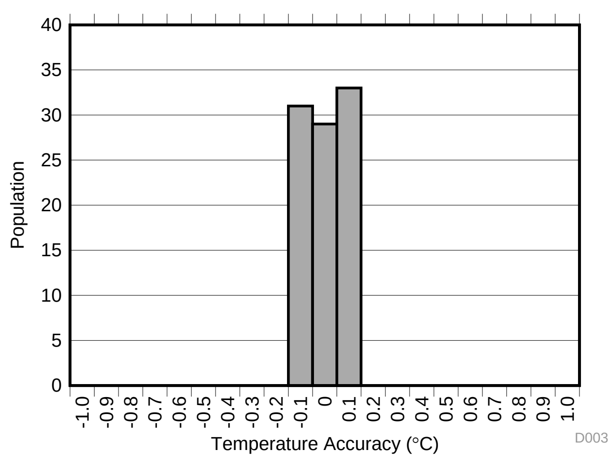
型番	パッケージ	本体サイズ(公称)
TMP303	SOT-563 (6)	1.60mm×1.20mm

(1) 利用可能なすべての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。

TMP303の機能ブロック図



トリップ・スレッショルドの精度（標準値）－20°C～125°C



English Data Sheet: SBOS486

目次

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 H (October 2018) から **Revision I** に変更 — **Page**

- Changed input pin voltage maximum value in the *Absolute Maximum Ratings* table from: ((V+) + 0.5) and ≤ 4 to: ((V_S) + 0.3) and ≤ 4 ... 4
- Changed output pin voltage maximum value n the *Absolute Maximum Ratings* table from: ((V+) + 0.5) and ≤ 4 to: ((V_S) + 0.3) and ≤ 4 ... 4

Revision F (February 2016) から **Revision G** に変更 — **Page**

- TMP303E、TMP303F、TMP303Gデバイスをデータシートに 追加 ... 1
- デバイスのオプションの数を4から7に 変更 ... 1
- Changed Trip Point Accuracy in *Electrical Characteristics* from T_A = -20 to 125°C to T_A = 60 to 125°C ... 5

Revision E (October 2015) から **Revision F** に変更 — **Page**

- 「デバイスのオプション」表への相互参照を 追加 ... 1
- 「トリップのスレッショルド精度」に新しい画像を 追加 ... 1
- Added Trip Points covering range -20 to 125°C ... 5
- Added Trip Accuracy Error vs Temperature graph. ... 6

Revision D (September 2015) から **Revision E** に変更 — **Page**

- Changed I/O value of $HYST_{SET1}$ row in *Pin Functions* table ... 3

Revision C (September 2015) から **Revision D** に変更 — **Page**

- 型番を汎用のTMP303に統合 ... 1

Revision B (January 2011) から Revision C に変更 **Page**

- 「*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、「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 追加 1

Revision A (September 2009) から Revision B に変更 **Page**

- データシートにTMP303Bデバイスを 追加 1

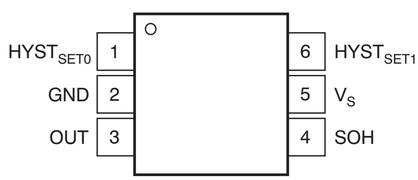
5 デバイスのオプション

デバイス	トリップ・ポイント(°C)
TMP303A	T_L = 0、T_H = 60(1)
TMP303B	T_L = 0、T_H = 55(1)
TMP303C	T_L = -20、T_H = 60(1)
TMP303D	T_L = -15、T_H = 125(1)
TMP303E	T_L = 0、T_H = 70(1)
TMP303F	T_L = 0、T_H = 80(1)
TMP303G	T_L = 0、T_H = 90(1)

(1) 他のトリップ・ポイントについては、TI代理店にお問い合わせください。

6 Pin Configuration and Functions

DRL Package
6-Pin SOT-563
Top View



Pin Functions

PIN		I/O	DESCRIPTION
NAME	NO.		
$HYST_{SET0}$	1	Digital Input	This pin is used to set the amount of thermal hysteresis.
GND	2	Ground	Ground
OUT	3	Digital Output	Active high, push-pull output pin. Does not require a pullup resistor to V_S.
SOH	4	Digital Input	Set output high (SOH) pin. If the SOH pin is pulled high, the TMP303 forces the output high. If the SOH pin is grounded or left floating, this pin has no effect on the behavior of the TMP303.
V_S	5	Power Supply	Power supply
$HYST_{SET1}$	6	Digital Input	This pin is used to set the amount of thermal hysteresis.

7 Specifications

7.1 Absolute Maximum Ratings

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

		MIN	MAX	UNIT
Supply Voltage, V_S – GND			4	V
Input Pins, Voltage	SOH, $HYST_{SET1}$, $HYST_{SET0}$	–0.5	((V_S) + 0.3) and ≤ 4	V
Output Pin, Voltage	OUT	–0.5	((V_S) + 0.3) and ≤ 4	V
Output Pin, Current	OUT	–55	8	mA
Operating Temperature			130	°C
Junction Temperature, T_J max			150	°C
Storage Temperature, T_{stg}		–60	150	°C

(1) Stresses beyond those listed under *Absolute Maximum Ratings* may cause permanent damage to the device. These are stress ratings only, which do not imply functional operation of the device at these or any other conditions beyond those indicated under *Recommended Operating Conditions*. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

7.2 ESD Ratings

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

7.3 Recommended Operating Conditions

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

		MIN	NOM	MAX	UNIT
V_S	Power Supply Voltage	1.4		3.6	V
T_A	Specified Temperature Range	–40		125	°C

7.4 Thermal Information

THERMAL METRIC(1)		TMP303 DRL (SOT-563) 6 PINS	UNIT
$R_{\theta JA}$	Junction-to-ambient thermal resistance	210.3	°C/W
$R_{\theta JC(top)}$	Junction-to-case (top) thermal resistance	105.0	°C/W
$R_{\theta JB}$	Junction-to-board thermal resistance	87.5	°C/W
ψ_{JT}	Junction-to-top characterization parameter	6.1	°C/W
ψ_{JB}	Junction-to-board characterization parameter	87.0	°C/W
$R_{\theta JC(bot)}$	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, SPRA953.

7.5 Electrical Characteristics

At T_A = –40°C to 125°C and V_S = 1.4 V to 3.6 V, unless otherwise noted.(1)

PARAMETER		CONDITIONS	MIN	TYP	MAX	UNIT
TEMPERATURE MEASUREMENT						
T_L, T_H Trip Point Accuracy(2)		T_A = 55°C to 60°C, V_S = 3.3 V		±0.2	±1	°C
		T_A = -20 to 60°C, V_S = 1.4 V to 3.6 V		±0.2	±1.5	°C
		T_A = 60 to 125°C, V_S = 1.4 V to 3.6 V		±0.2	±2.0	°C
		vs Supply		±0.1		°C/V
Hysteresis		See *Bit Setting vs Hysteresis Window*	1		10	°C
HYSTERESIS SET INPUT						
Input Logic Levels	V_{IH}		0.7 × V_S		3.6	V
	V_{IL}		–0.5		0.3 × V_S	V
Input Current	I_{IN}	0 < V_{IN} < 3.6 V			1	µA
SOH INPUT						
Pulldown Resistor Value			80	100	120	kΩ
Input Logic Levels	V_{IH}		0.7 × V_S		3.6	V
	V_{IL}		–0.5		0.3 × V_S	V
Input Current		V_{IN} = 3.6 V		36		µA
OUTPUT						
Output Logic Levels	V_{OH}	V_S > 2 V, I_{OH} = 0.5 mA	V_S – 0.4		V_S	V
		V_S < 2 V, I_{OH} = 0.5 mA	V_S – 0.2 × (V_S)		V_S	V
	V_{OL}	V_S > 2 V, I_{OL} = 1 mA	0		0.4	V
		V_S < 2 V, I_{OL} = 1 mA	0		0.2 × V_S	V
POWER SUPPLY						
Specified Supply Voltage Range	V_S		1.4		3.6	V
Power-up Start-up Time		V_S > 1.4 V	20	28	35	ms
Quiescent Current	I_Q	T_A = –55°C to 60°C		3.5	5	µA
		T_A = –40°C to 125°C		4	8	µA
TEMPERATURE RANGE						
Specified Range			–40		125	°C
Operating Range			–55		130	°C

(1) 100% of all units are production tested at T_A = 25°C. Over temperature specifications are specified by design.
(2) T_L, T_H are device-specific. For example, TMP303A T_L = 0°C, T_H = 60°C; TMP303B T_L = 0°C, T_H = 55°C; TMP303C T_L = –20°C, T_H = 60°C; TMP303D T_L = –15°C, T_H = 125°C; TMP303E T_L = 0°C, T_H = 70°C; TMP303F T_L = 0°C, T_H = 80°C; TMP303G T_L = 0°C, T_H = 90°C

7.6 Typical Characteristics

At V_S = 3.3 V and T_A = 25°C, unless otherwise noted.

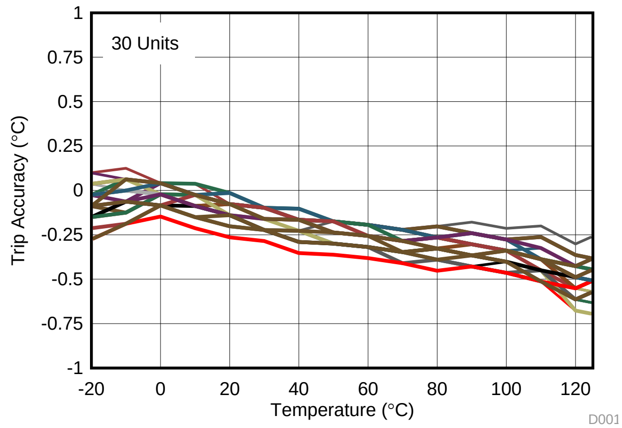


Figure 1. Trip Accuracy Error vs Temperature

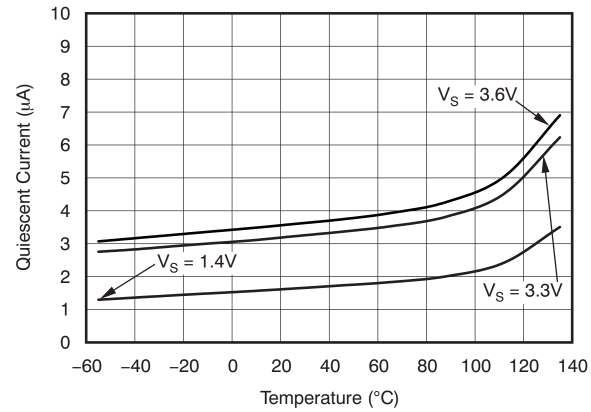


Figure 2. Quiescent Current vs Temperature

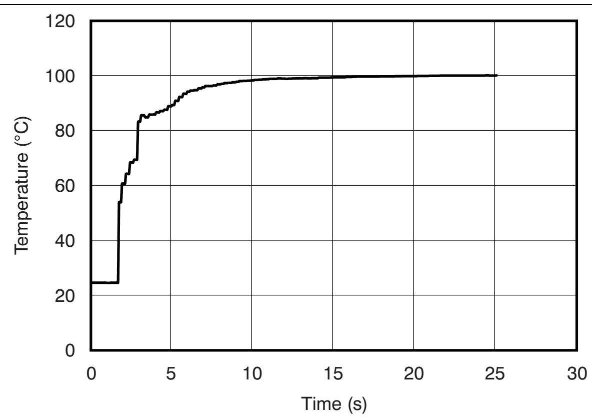


Figure 3. Temperature Step Response in Perfluorinated Fluid at 100°C vs Time

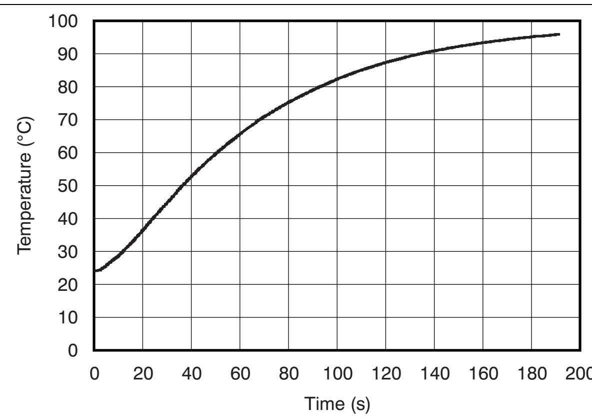


Figure 4. Thermal Step Response in Air at 100°C vs Time

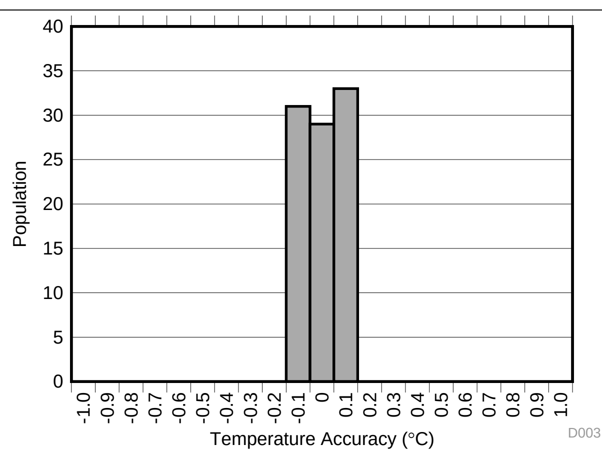


Figure 5. Trip Threshold Accuracy at -20°C to 125°C

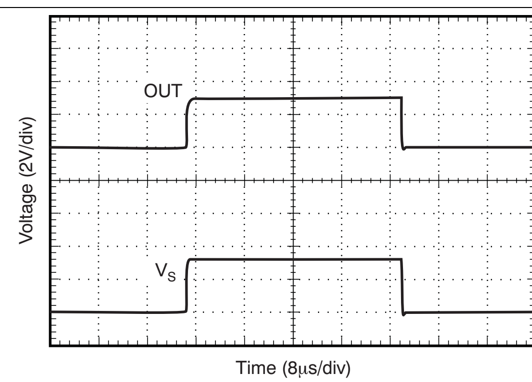


Figure 6. Power-Up and Power-Down Transient Response

Typical Characteristics (continued)

At V_S = 3.3 V and T_A = 25°C, unless otherwise noted.

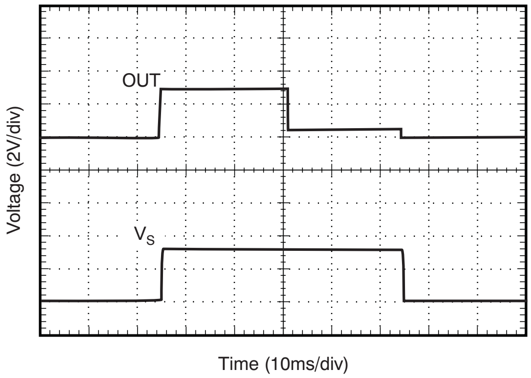


Figure 7. Power-Up, Trip, and Power-Down Response

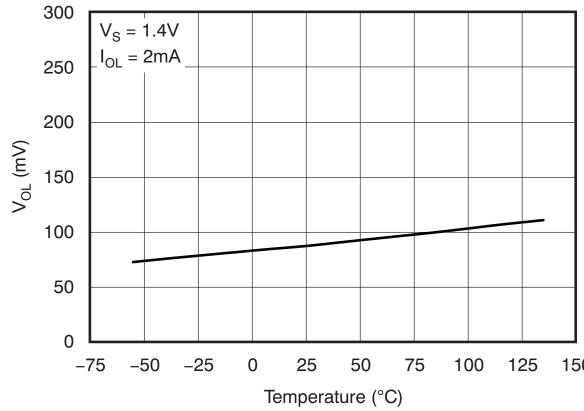


Figure 8. Output Logic Level Low vs Temperature

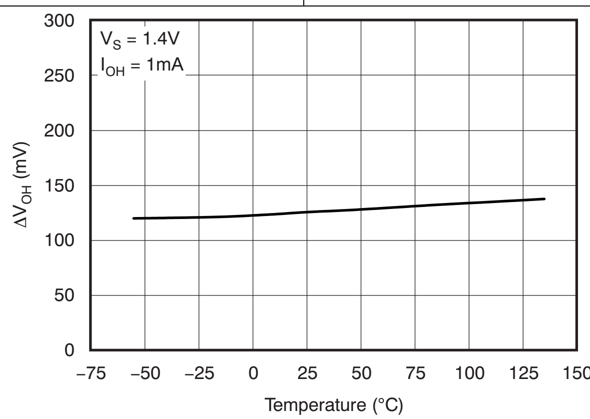


Figure 9. Output Logic Level High vs Temperature

8 Detailed Description

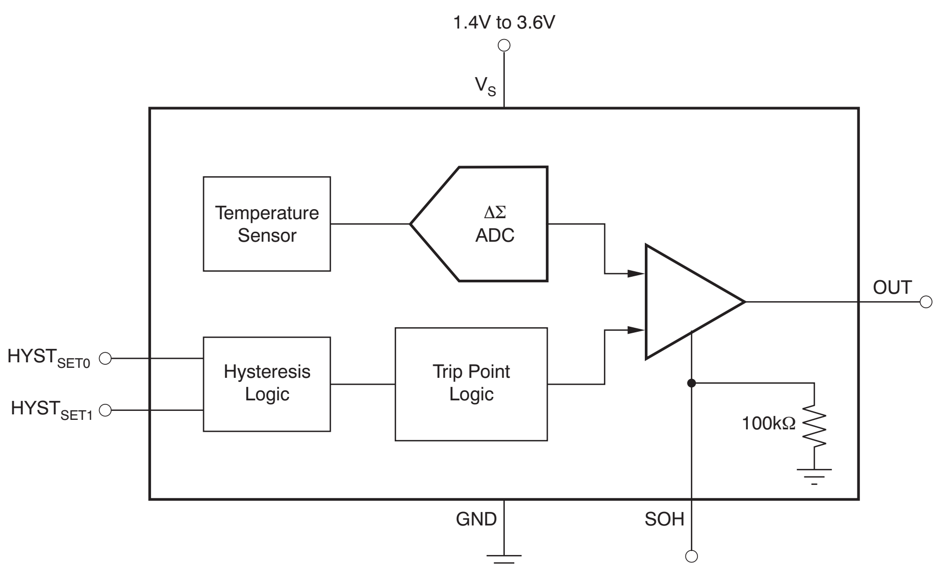
8.1 Overview

The TMP303 devices are temperature switches used in battery-powered applications that require accurate monitoring of a very specific temperature range from 0°C to 60°C (TMP303A), 0°C to 55°C (TMP303B), –20°C to 60°C (TMP303C), –15°C to 125°C (TMP303D), 0°C to 70°C (TMP303E), 0°C to 80°C (TMP303F) or 0°C to 90°C (TMP303G). This functionality is accomplished through the preset trip window and two hysteresis bits, $HYST_{SET0}$ and $HYST_{SET1}$. The preset trip window temperature thresholds are configured at the factory; for other trip points, contact a TI representative. Table 1 summarizes the bit setting versus hysteresis temperature window.

Table 1. Bit Setting vs Hysteresis Window

$HYST_{SET1}$	$HYST_{SET0}$	HYSTERESIS
GND	GND	1°C
GND	V_S	2°C
V_S	GND	5°C
V_S	V_S	10°C

8.2 Functional Block Diagram



8.3 Feature Description

8.3.1 $HYST_{SET0}$, $HYST_{SET1}$ and SOH Functionality

The TMP303A temperature trip window resides within the range of 0°C to 60°C, the TMP303B within 0°C to 55°C, the TMP303C within –20°C to 60°C, the TMP303D within –15°C to 125°C, the TMP303E within 0°C to 70°C, the TMP303F within 0°C to 80°C, and the TMP303G within 0°C to 90°C. When any of these trip thresholds is crossed, the output (OUT) changes state from low to high. OUT does not return to its original low state until the temperature crosses the hysteresis threshold and returns within the range of the temperature trip window.

As an example, if the TMP303A is configured with a 10°C hysteresis window (that is, $HYST_{SET0}$ = $HYST_{SET1}$ = V_S), the output does not return to its low state until the temperature either crosses (T_L + *hysteresis*) = 10°C or (T_H – *hysteresis*) = 50°C. The Set Output High (SOH) pin is intended to add test functionality to verify the connectivity of the output (OUT) pin to the system controller or other temperature response system. The SOH pin is internally pulled down to ground with a 100-kΩ resistor. If the SOH pin is grounded or left floating, it has no effect on the behavior of the TMP303A. If the SOH pin is pulled high, the TMP303A immediately forces the output high, regardless of temperature.

NOTE

This response occurs even if the temperature falls within the 0°C to 60°C temperature window.

Figure 10 shows this design in graphical form.

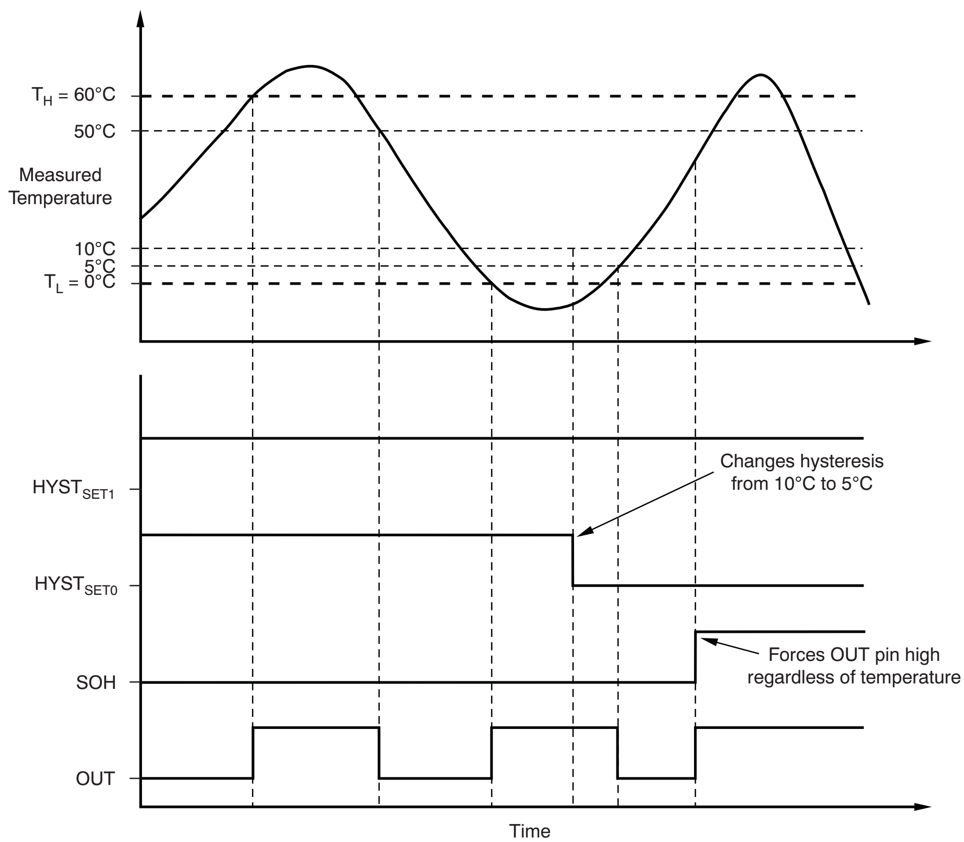


Figure 10. TMP303A Output Transfer Curves With Hysteresis Change from 10°C to 5°C and SOH Functionality

Feature Description (continued)

8.3.2 TMP303 Power Up and Timing

At device power up, the TMP303 exerts OUT = high, and typically requires 26 ms to return to a low state only if the temperature falls within the hysteresis window set by $HYST_{SET0}$ and $HYST_{SET1}$.

The tolerance of the thermal response time is largely a result of the differences in conversion time, which varies from 20 ms to 35 ms; likewise, this conversion does not take place after a power cycle until the supply voltage has reached a level of at least 1.4 V. This sequence is illustrated in Figure 11.

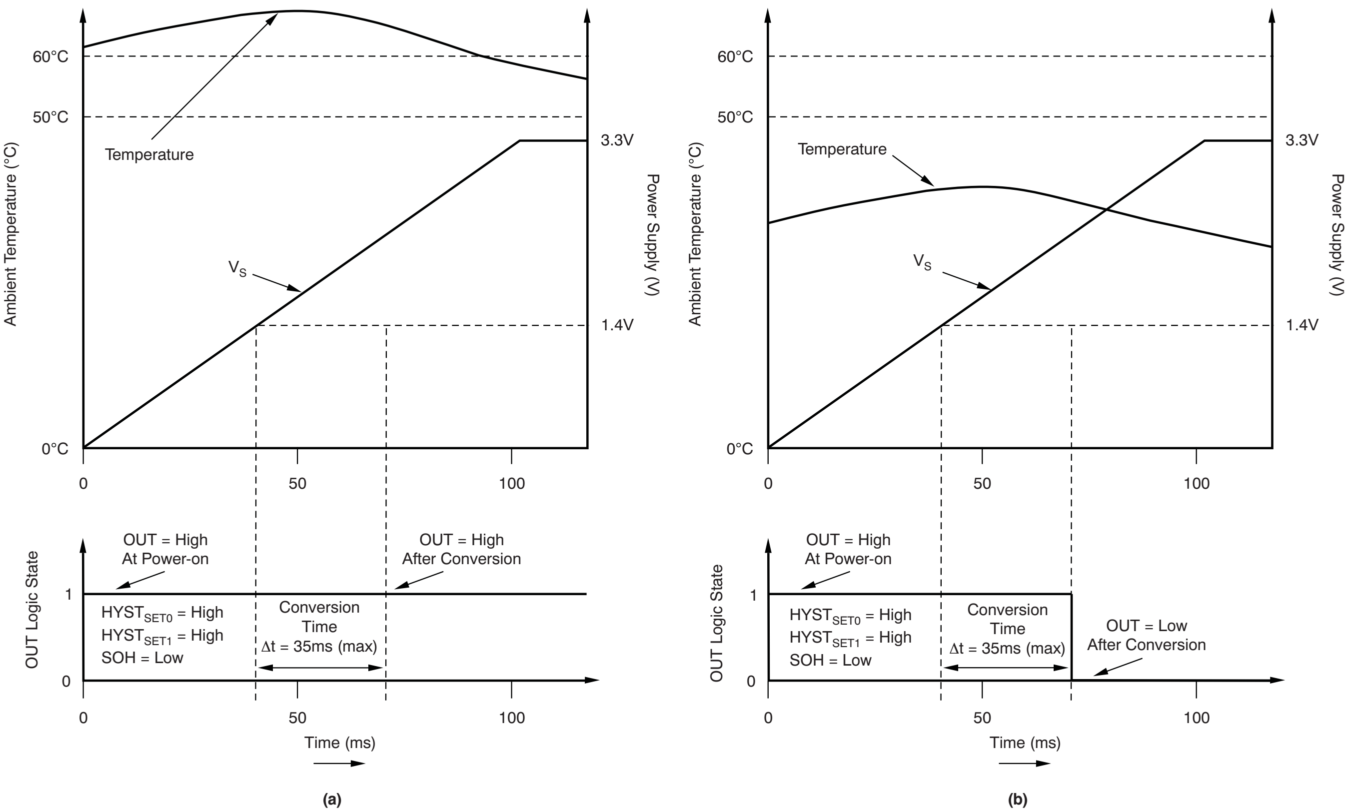


Figure 11. TMP303A Start-Up Delay vs Output Voltage ($HYST_{SET0}$ = $HYST_{SET1}$ = V_S)

After the TMP303 powers up, all successive thermal response results for the device are achieved in a time frame of 0.985 s to 1 s. This period is the minimum time frame required for the push-pull output (OUT) to change its state from high to low (or conversely) when the device is active.

Feature Description (continued)

A maximum low output voltage is defined as a voltage level equivalent to (0.2 × V_S); likewise, a minimum high-output voltage is defined as (0.8 × V_S). The timing associated with start-up time and conversion is shown in Figure 12.

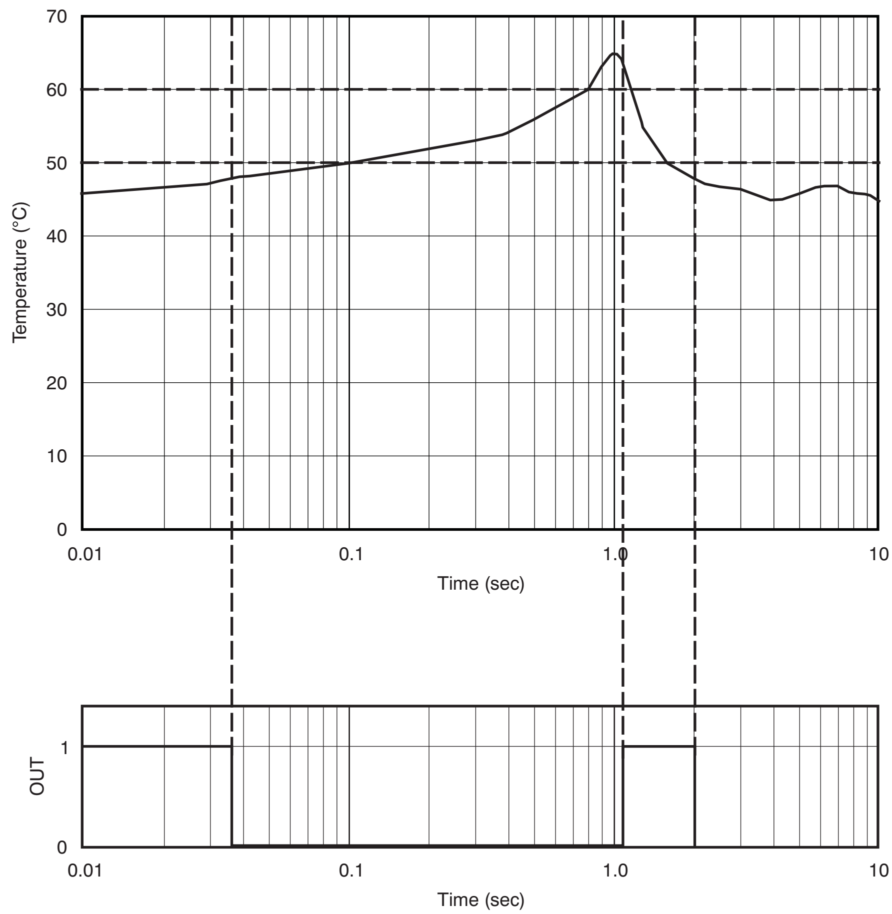


Figure 12. TMP303A Start-Up and Conversion Timing ($HYST_{SET0}$ = $HYST_{SET1}$ = V_S)

8.4 Device Functional Modes

The TMP303 family of devices has a single functional mode. Normal operation for the TMP303 family of devices occurs when the power-supply voltage applied between the V_S pin and GND is within the specified operating range of 1.4 to 3.6 V.The temperature threshold is configured at the factory and the hysteresis is selected by connecting the $HYST_{SET0}$ and $HYST_{SET1}$ pins to either the GND or Vs pins (see Table 1).

9 Application and Implementation

NOTE

Information in the following applications sections is not part of the TI component specification, and TI does not warrant its accuracy or completeness. TI's customers are responsible for determining suitability of components for their purposes. Customers should validate and test their design implementation to confirm system functionality.

9.1 Application Information

The TMP303 family of devices is simple to configure. The TMP303 contains an active high, push-pull output stage and does not require a pullup resistor to V_S for proper operation. The only external component that the device requires is a bypass capacitor. TI strongly recommends using a 0.1-µF capacitor, placed as close as possible to the supply pin.

9.2 Typical Applications

9.2.1 TMP303 Typical Configuration

Figure 13 shows the typical circuit configuration for the TMP303 family of devices. These devices have preprogrammed trip-points. Select the TMP303 device that meets the application temperature trip requirement.

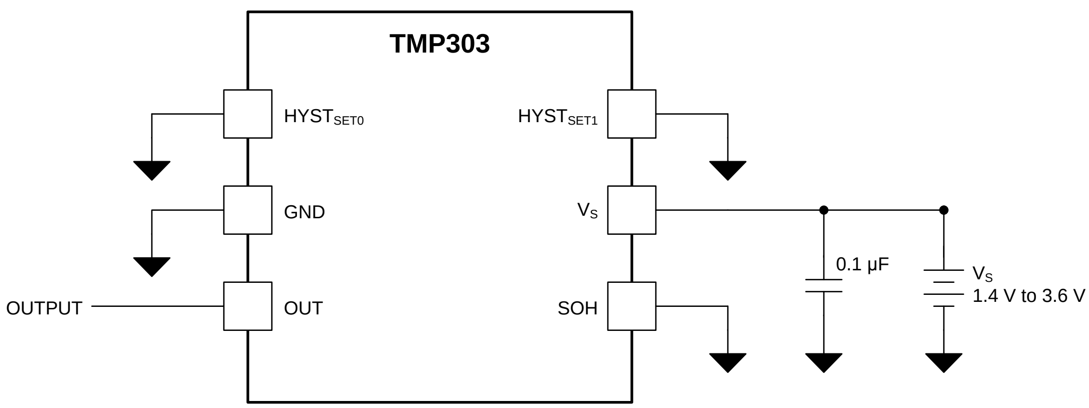


Figure 13. TMP303 Typical Application Configuration Schematic

9.2.1.1 Design Requirements

The TMP303 is a temperature switch commonly used to signal a microprocessor in the event of an over or under temperature condition. The temperature that the TMP303 issues a output is determined by the device preset trip window. The TMP303 issues an output when the temperature threshold is exceeded. To avoid the TMP303 signaling the microprocessor as soon as the temperature drops below the temperature threshold the TMP303 has a built-in hysteresis. The amount of hysteresis is determined by the hysteresis pins, $HYST_{SET0}$ and $HYST_{SET1}$. These pins are digital inputs and must be tied either high or low, according to Table 1.

9.2.1.2 Detailed Design Procedure

Select the appropriate TMP303 device that matches the application requirements; see the *デバイスのオプション* table for different trip point ranges. Connect the $HYST_{SET0}$ and $HYST_{SET1}$ pins according to the application requirements; see Table 1. In Figure 13 the TMP303 device is configured with a 1°C hysteresis window (that is, $HYST_{SET0}$ = $HYST_{SET1}$ = GND). Place a 0.1-µF bypass capacitor close to the TMP303 device to reduce the noise coupled from the power supply.

Typical Applications (continued)

9.2.1.3 Application Curves

Figure 14 and Figure 15 show the TMP303A power-on response with the ambient temperature (T_A) less than 60°C and greater than 60°C respectively. TMP303B, TMP303C, TMP303D, TMP303E, TMP303F, and TMP303G devices behave similarly with regards to power-on response with T_A below or above the trip point.

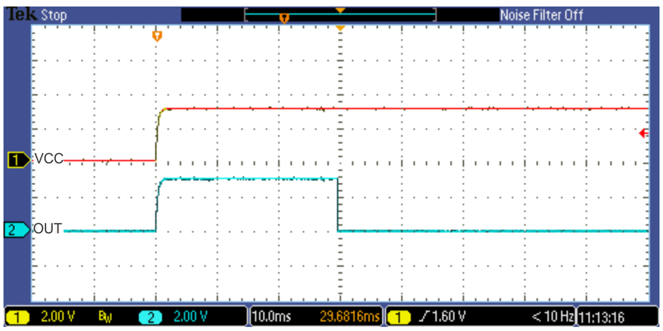


Figure 14. TMP303A Power-On Response, T_A Less Than 60°C

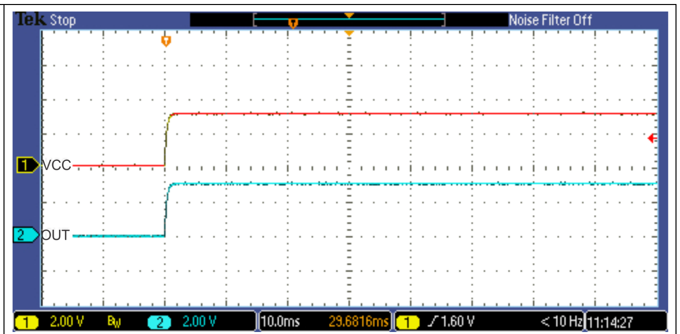


Figure 15. TMP303A Power-On Response, T_A Greater Than 60°C

9.2.2 TMP303 With Switches

Figure 16 shows the most generic implementation of the TMP303 family of devices. Switches are shown connecting the $HYST_{SET0}$ and $HYST_{SET1}$ pins to either V_S or GND. The use of switches is not a requirement; the switches are shown only to illustrate the various pin connection combinations. In practice, connecting the $HYST_{SET0}$ and $HYST_{SET1}$ pins to ground or directly to the V_S pin is sufficient and minimizes board space and cost. If additional flexibility is desired, connections from the $HYST_{SET0}$ and $HYST_{SET1}$ pins can be made through 0-Ω resistors, which can be either populated or not, depending upon the desired connection.

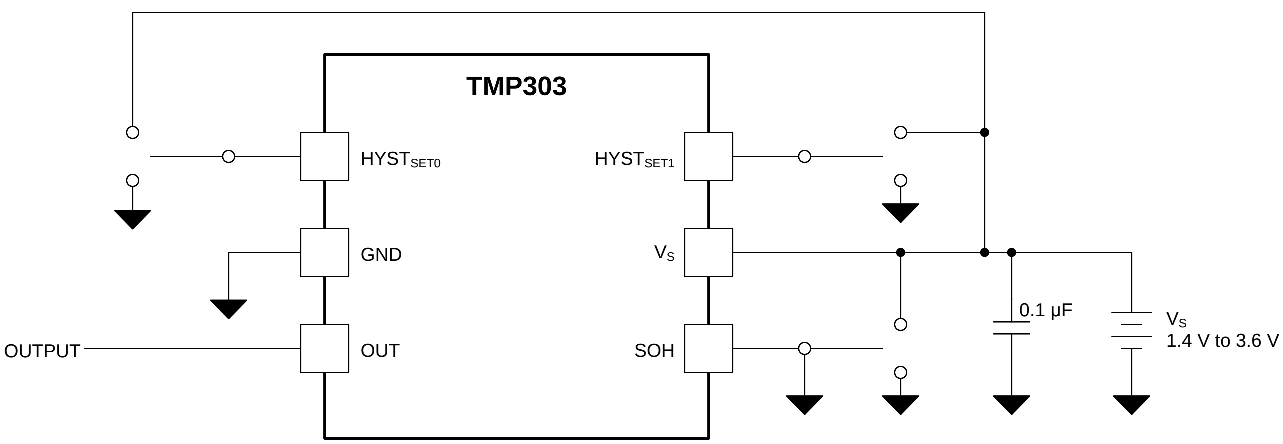


Figure 16. TMP303 With Switches

Typical Applications (continued)

9.2.3 Simple Fan Controller

The circuit in Figure 17 senses system temperature and turns a cooling fan on when the sensor's temperature exceeds a preselected value. The TMP303 device can be used directly to control the fan. The OUT pin is active high, and it can be used directly to drive the DC fan. When temperature is within the temperature limits of the system, the fan turns off, and when the temperature exceeds the trip-point, the fan turns on. In this example, the TMP303A device is used and is configured with a 1°C hysteresis window ($HYST_{SET0}$ = $HYST_{SET1}$ = GND). The TMP303A high trip-point is 60°C. When this trip-point temperature is exceeded, the output (OUT) changes state from low to high. The output does not return to its low state until the temperature decreases below (T_H – *hysteresis*) = 59°C.

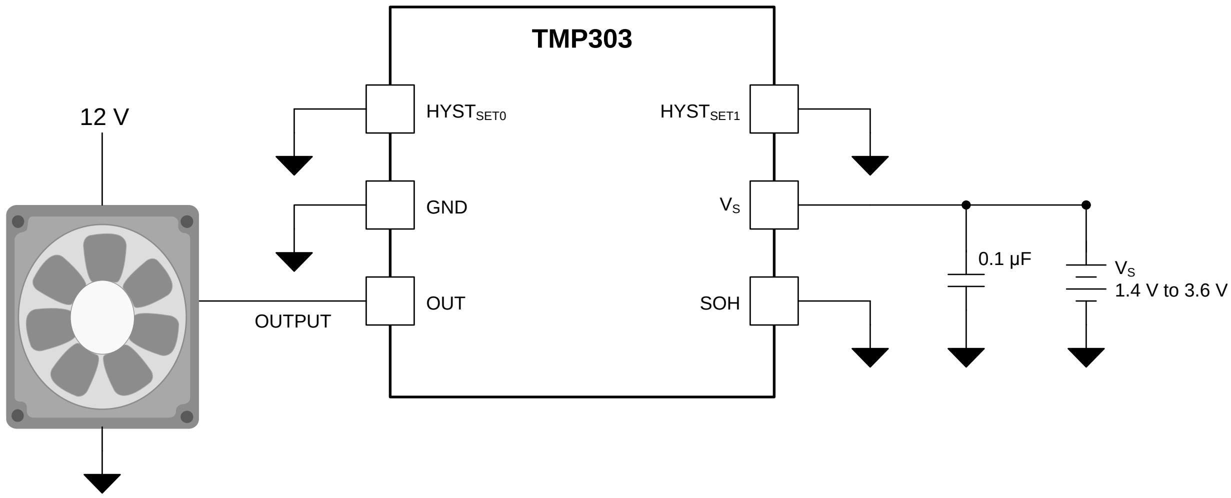


Figure 17. Simple Fan Controller

Typical Applications (continued)

9.2.4 Wireless Fixed Temperature Heat Detector

Heat detectors are needed in building automation. Conventional heat detectors need cables to supply power and send the information back to a central system. Adding cables can be very costly and technically challenging in old buildings, this leads to wireless battery operated heat detectors as preferred solutions. Running on battery requires designing a very low power system for long haul. TMP303 can be used to design a low power heat detector due to its very low quiescent current (5 µA maximum). The TMP303 device does not require any additional components and can be interfaced with the MCU using only one GPIO. As an example, a wireless transceiver with internal MCU can be used to monitor the TMP303 and communicate with a central system or turn on an alarm in case of temperatures exceeding the trip-point. Figure 18 shows typical connections.

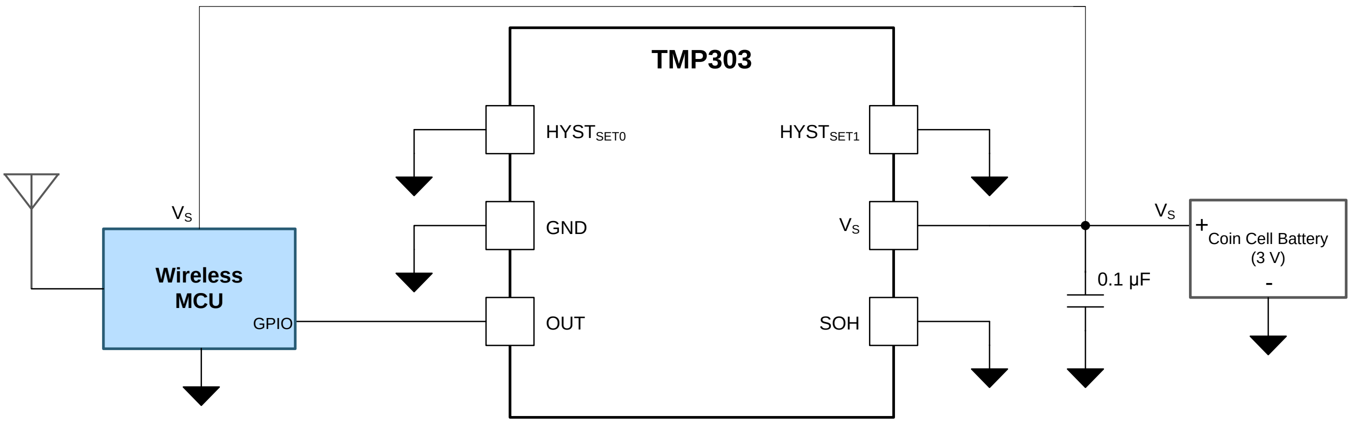


Figure 18. Wireless Fixed Temperature Heat Detector

10 Power Supply Recommendations

The TMP303 family of devices is designed to operate from a single power supply within the range of 1.4 V to 3.6 V. No specific power supply sequencing with respect to any of the input or output pins is required.

11 Layout

11.1 Layout Guidelines

Mount the TMP303 to a PCB as shown in Figure 19. For this example the $HYST_{SET0}$ and $HYST_{SET1}$ pins are connected directly to ground. Connecting these pins to ground configures the device for 1°C hysteresis. The SOH pin is grounded in this layout. Leaving this pin floating has no effect on the behavior of the TMP303.

- Bypass the V_S pin to ground with a low-ESR ceramic bypass capacitor. The typical recommended bypass capacitance is a 0.1-µF ceramic capacitor with a X5R or X7R dielectric. The optimum placement is closest to the V_S and GND pins of the device. Take care in minimizing the loop area formed by the bypass-capacitor connection, the V_S pin, and the GND pin of the IC. Additional bypass capacitance can be added to compensate for noisy or high-impedance power supplies.
- The OUT pin is a push-pull, active-high output and does not require a pullup resistor to V_S.

11.2 Layout Example

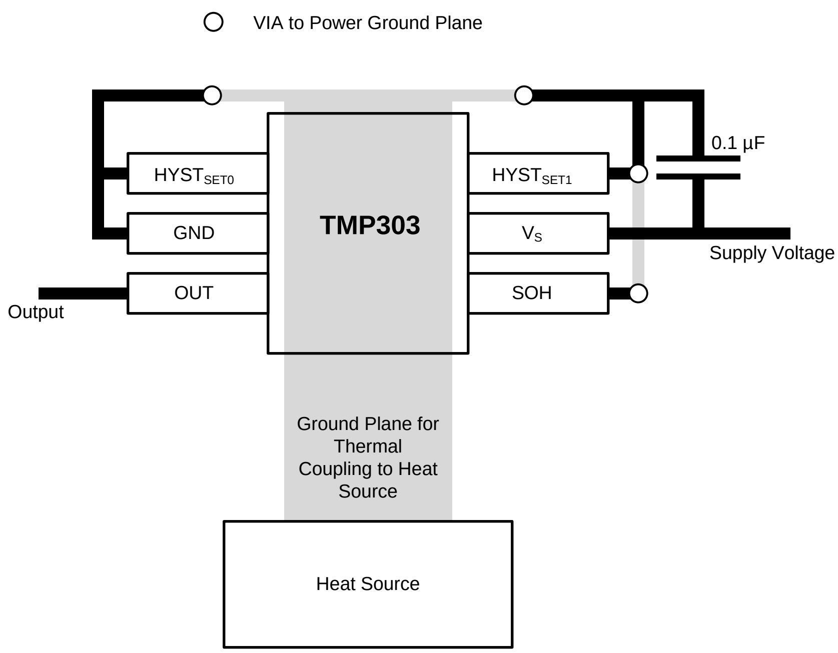


Figure 19. PCB Layout Example

12 デバイスおよびドキュメントのサポート

12.1 ドキュメントの更新通知を受け取る方法

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12.2 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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12.3 商標

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12.4 静電気放電に関する注意事項

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静電気放電はわずかな性能の低下から完全なデバイスの故障に至るまで、様々な損傷を与えます。高精度の集積回路は、損傷に対して敏感であり、極めてわずかなパラメータの変化により、デバイスに規定された仕様に適合しなくなる場合があります。

12.5 Glossary

SLYZ022 — *TI Glossary*.
This glossary lists and explains terms, acronyms, and definitions.

13 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、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 Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead finish/ Ball material (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
TMP303ADRLR	ACTIVE	SOT-5X3	DRL	6	4000	RoHS & Green	NIPDAU | NIPDAUAG	Level-1-260C-UNLIM	-40 to 125	OCO	Samples
TMP303ADRLT	OBSOLETE	SOT-5X3	DRL	6		TBD	Call TI	Call TI	-40 to 125	OCO	
TMP303BDRLR	ACTIVE	SOT-5X3	DRL	6	4000	RoHS & Green	NIPDAU | NIPDAUAG	Level-1-260C-UNLIM	-40 to 125	QWM	Samples
TMP303BDRLT	OBSOLETE	SOT-5X3	DRL	6		TBD	Call TI	Call TI	-40 to 125	QWM	
TMP303CDRLR	ACTIVE	SOT-5X3	DRL	6	4000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 125	11U	Samples
TMP303CDRLT	OBSOLETE	SOT-5X3	DRL	6		TBD	Call TI	Call TI	-40 to 125	11U	
TMP303DDRLR	ACTIVE	SOT-5X3	DRL	6	4000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 125	(11U, 12Z)	Samples
TMP303DDRLT	OBSOLETE	SOT-5X3	DRL	6		TBD	Call TI	Call TI	-40 to 125	12Z	
TMP303EDRLR	ACTIVE	SOT-5X3	DRL	6	4000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 125	17Z	Samples
TMP303EDRLT	OBSOLETE	SOT-5X3	DRL	6		TBD	Call TI	Call TI	-40 to 125	17Z	
TMP303FDRLR	ACTIVE	SOT-5X3	DRL	6	4000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 125	18A	Samples
TMP303FDRLT	OBSOLETE	SOT-5X3	DRL	6		TBD	Call TI	Call TI	-40 to 125	18A	
TMP303GDRLR	ACTIVE	SOT-5X3	DRL	6	4000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 125	18B	Samples
TMP303GDRLT	OBSOLETE	SOT-5X3	DRL	6		TBD	Call TI	Call TI	-40 to 125	18B	

(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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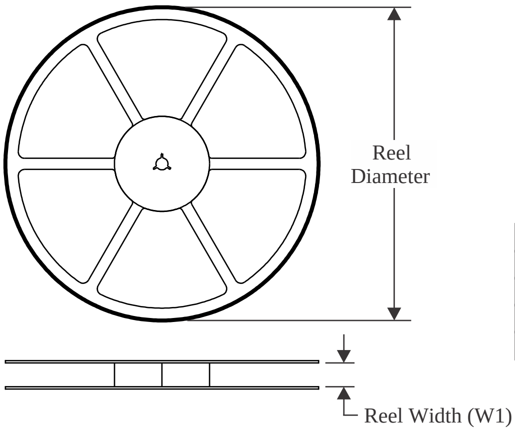
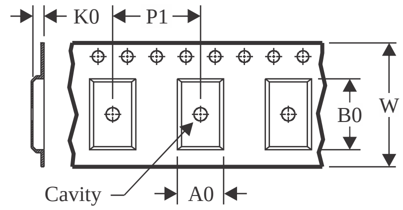
TAPE AND REEL INFORMATION

REEL DIMENSIONS

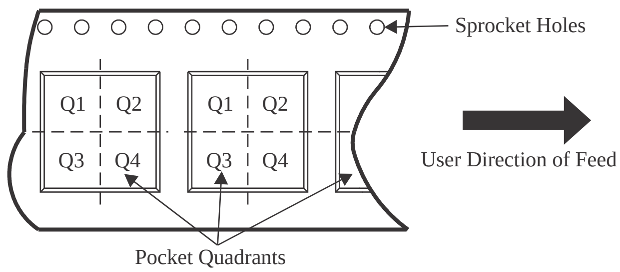


TAPE DIMENSIONS



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

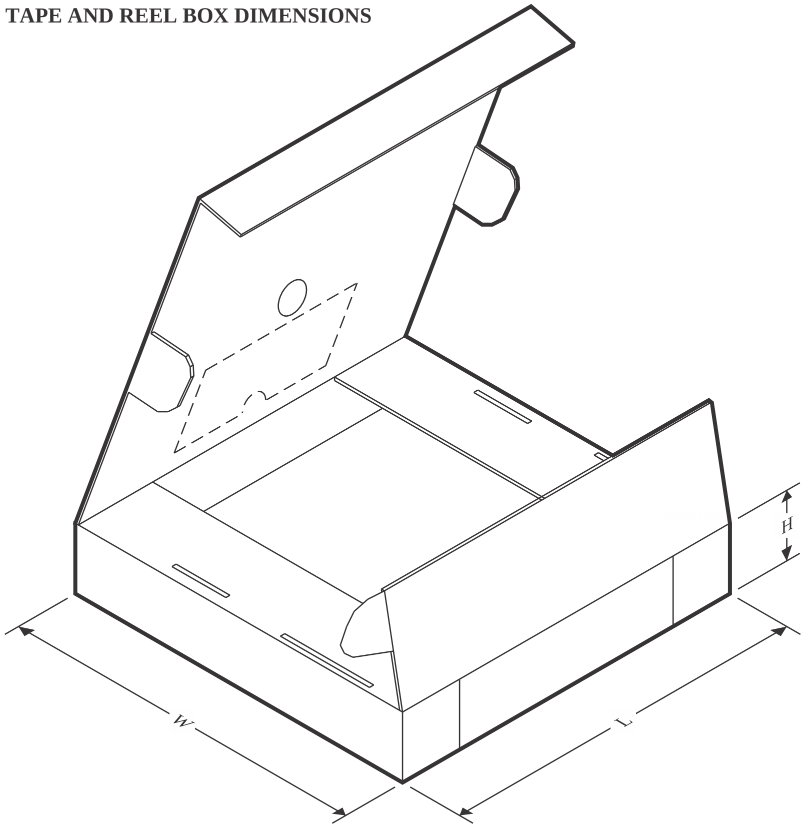
QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*All dimensions are nominal

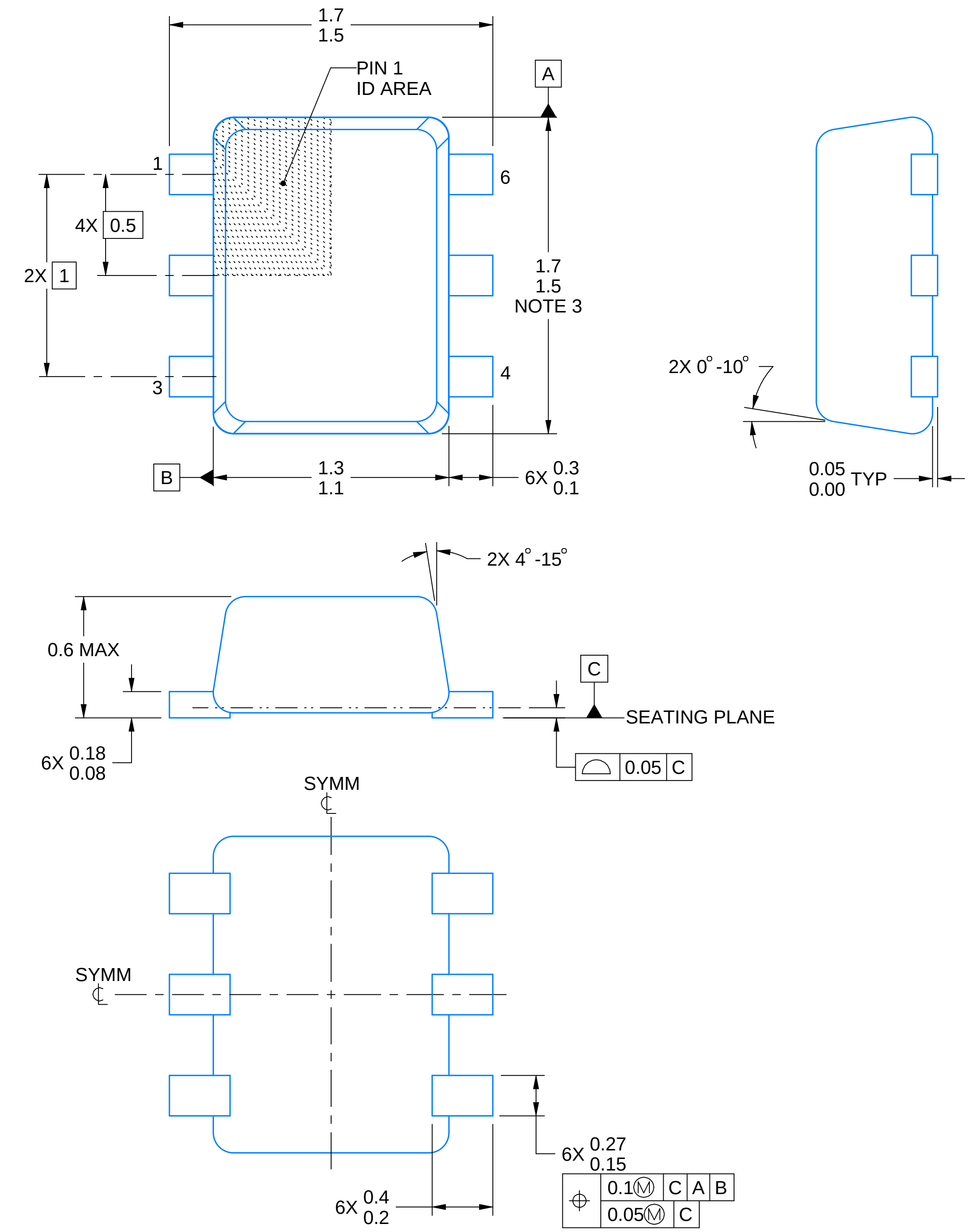
Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
TMP303ADRLR	SOT-5X3	DRL	6	4000	180.0	8.4	2.0	1.8	0.75	4.0	8.0	Q3
TMP303BDRLR	SOT-5X3	DRL	6	4000	180.0	8.4	2.0	1.8	0.75	4.0	8.0	Q3
TMP303BDRLR	SOT-5X3	DRL	6	4000	180.0	8.4	1.98	1.78	0.69	4.0	8.0	Q3
TMP303CDRLR	SOT-5X3	DRL	6	4000	180.0	8.4	2.0	1.8	0.75	4.0	8.0	Q3
TMP303DDRLR	SOT-5X3	DRL	6	4000	180.0	8.4	2.0	1.8	0.75	4.0	8.0	Q3
TMP303EDRLR	SOT-5X3	DRL	6	4000	180.0	8.4	2.0	1.8	0.75	4.0	8.0	Q3
TMP303FDRLR	SOT-5X3	DRL	6	4000	180.0	8.4	2.0	1.8	0.75	4.0	8.0	Q3
TMP303GDRLR	SOT-5X3	DRL	6	4000	180.0	8.4	2.0	1.8	0.75	4.0	8.0	Q3

TAPE AND REEL BOX DIMENSIONS



*All dimensions are nominal

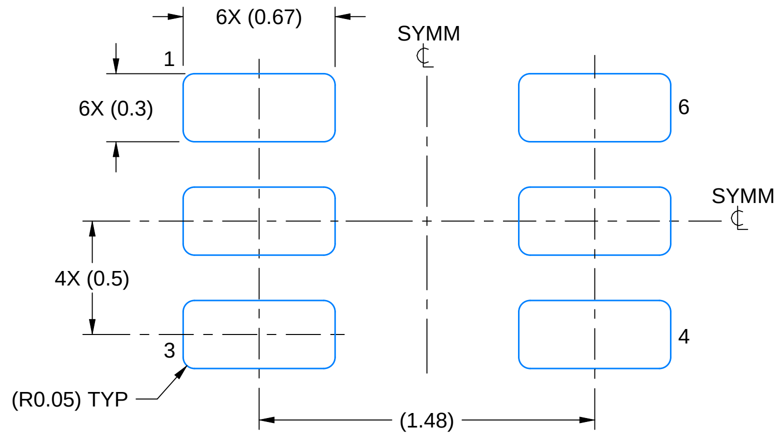
Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
TMP303ADRLR	SOT-5X3	DRL	6	4000	210.0	185.0	35.0
TMP303BDRLR	SOT-5X3	DRL	6	4000	210.0	185.0	35.0
TMP303BDRLR	SOT-5X3	DRL	6	4000	202.0	201.0	28.0
TMP303CDRLR	SOT-5X3	DRL	6	4000	210.0	185.0	35.0
TMP303DDRLR	SOT-5X3	DRL	6	4000	210.0	185.0	35.0
TMP303EDRLR	SOT-5X3	DRL	6	4000	210.0	185.0	35.0
TMP303FDRLR	SOT-5X3	DRL	6	4000	210.0	185.0	35.0
TMP303GDRLR	SOT-5X3	DRL	6	4000	210.0	185.0	35.0



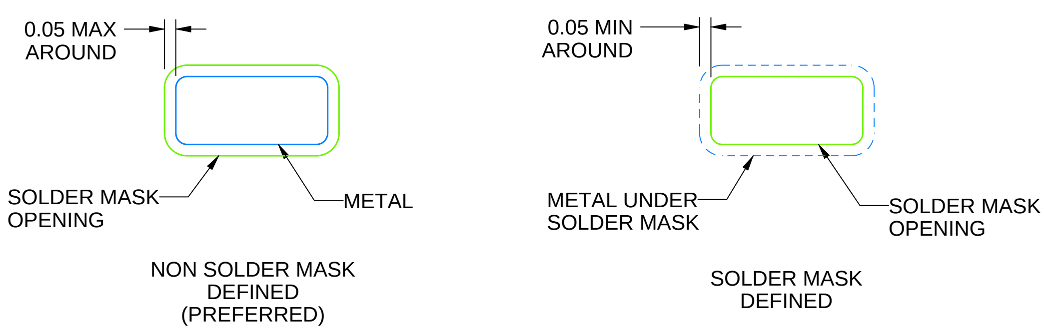
4223266/F 11/2024

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. 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. Reference JEDEC registration MO-293 Variation UAAD



LAND PATTERN EXAMPLE
SCALE:30X



SOLDERMASK DETAILS

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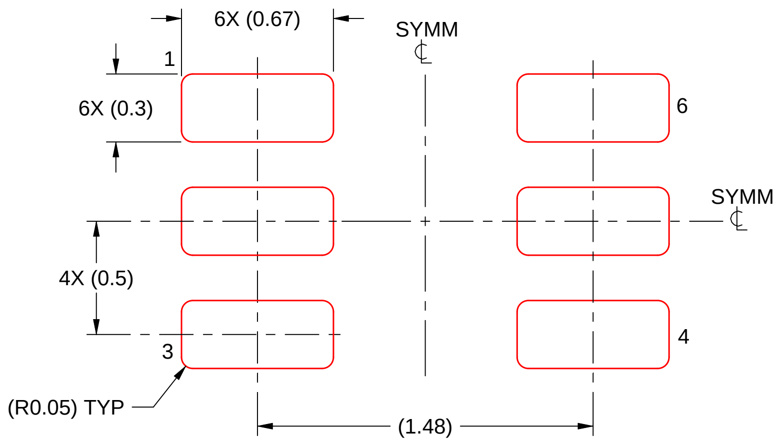
NOTES: (continued)

5. Publication IPC-7351 may have alternate designs.
6. Solder mask tolerances between and around signal pads can vary based on board fabrication site.
7. Land pattern design aligns to IPC-610, Bottom Termination Component (BTC) solder joint inspection criteria.



SOLDER PASTE EXAMPLE
BASED ON 0.1 mm THICK STENCIL
SCALE:30X

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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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