TPS3710 宽 VIN 电压检测器

1 特性

- 宽电源电压范围：1.8V 至 18V
- 可调节阈值：低至 400mV
- 高阈值精度：
  - 在温度范围内为 1.0%
  - 0.25%（典型值）
- 低静态电流：5.5μA（典型值）
- 漏极开路输出
- 内部滞后：5.5mV（典型值）
- 温度范围：-40°C 至 +125°C
- 封装：
  - 小外形尺寸晶体管 (SOT)-6 封装
  - 1.5mm × 1.5mm 晶圆级小外形无引线 (WSON)-6 封装

2 应用

- 工业控制系统
- 车载系统
- 嵌入式计算模块
- 数字信号处理器 (DSP)、微控制器、或者微处理器应用
- 笔记本和台式计算机
- 便携式和电池供电类产品
- 现场可编程门阵列 (FPGA) 和专用集成电路 (ASIC) 应用

3 说明

TPS3710 宽电源电压检测器在 1.8V 至 18V 的电压范围内运行。 此器件具有一个内部基准电压为 400mV 的高精度比较器和一个额定电压为 18V 的开漏输出，用于实现精确的电压检测。 可以使用外部电阻设置监视电压。

当 SENSE 引脚上的电压下降至低于 (V_{IT-}) 时，OUT 引脚被驱动至低电平，而当电压返回到对应阈值 (V_{IT+}) 之上时，OUT 引脚变为高电平。 TPS3701 的比较器均内置有滞后特性，可抑制短小毛刺脉冲，从而确保输出操作稳定而无错误触发。

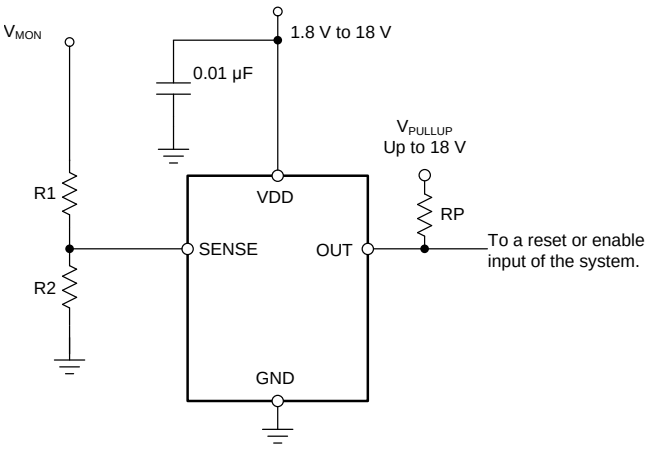
TPS3710 提供 SOT-6 封装和 1.5mm × 1.5mm WSON-6 封装，额定工作结温范围为 –40°C 至 +125°C。

器件信息 (1)

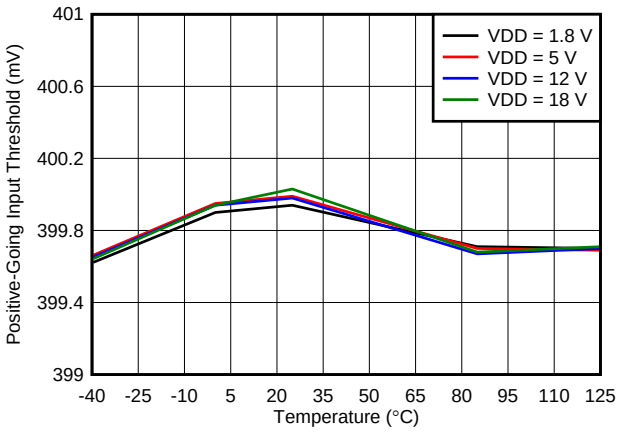
部件号	封装	封装尺寸（标称值）
TPS3710	SOT (6)	2.90mm x 1.60mm
	WSON (6)	1.50mm x 1.50mm

(1) 要了解所有可用封装，请见数据表末尾的封装选项附录。

简化电路原理图



上升输入阈值电压 (V_{IT+}) 与温度间的关系



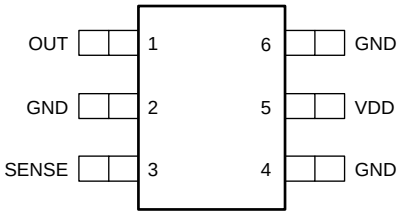
目录

4 修订历史记录

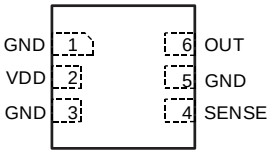
日期	修订版本	注释
2015 年 10 月	*	最初发布版本

5 Pin Configuration and Functions

DDC Package
6-Pin SOT
Top View



DSE Package
6-Pin WSON
Top View



Pin Functions

PIN			I/O	DESCRIPTION
NAME	DDC	DSE		
GND	2, 4, 6	1, 3, 5	—	Connect all three pins to ground.
OUT	1	6	O	SENSE comparator open-drain output. OUT is driven low when the voltage at this comparator is below (V_{IT-}). The output goes high when the sense voltage returns above the respective threshold (V_{IT+}).
SENSE	3	4	I	This pin is connected to the voltage to be monitored with the use of an external resistor divider. When the voltage at this pin drops below the threshold voltage (V_{IT-}), OUT is driven low.
VDD	5	2	I	Supply voltage input. Connect a 1.8-V to 18-V supply to VDD to power the device. Good analog design practice is to place a 0.1-µF ceramic capacitor close to this pin.

6 Specifications

6.1 Absolute Maximum Ratings

over operating temperature range (unless otherwise noted)(1)

		MIN	MAX	UNIT
Voltage(2)	VDD	–0.3	20	V
	OUT	–0.3	20	
	SENSE	–0.3	7	
Current	OUT (output sink current)		40	mA
Temperature	Operating junction, T_J	–40	125	°C
	Storage, T_{stg}	–65	150	

(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.
(2) All voltages are with respect to network ground pin.

6.2 ESD Ratings

			VALUE	UNIT
$V_{(ESD)}$	Electrostatic discharge	Human body model (HBM), per ANSI/ESDA/JEDEC JS-001, all pins (1)	±2500	V
		Charged device model (CDM), per JEDEC specification JESD22-C101, all pins (2)	±1000	

(1) JEDEC document JEP155 states that 500-V HBM allows safe manufacturing with a standard ESD control process.
(2) JEDEC document JEP157 states that 250-V CDM allows safe manufacturing with a standard ESD control process.

6.3 Recommended Operating Conditions

over operating temperature range (unless otherwise noted)

			MIN	NOM	MAX	UNIT
V_{DD}	Supply voltage		1.8		18	V
V_I	Input voltage	SENSE	0		6.5	V
V_O	Output voltage	OUT	0		18	V

6.4 Thermal Information

THERMAL METRIC (1)		TPS3710		UNIT
		DDC (SOT)	DSE (WSON)	
		6 PINS	6 PINS	
$R_{\theta JA}$	Junction-to-ambient thermal resistance	204.6	194.9	°C/W
$R_{\theta JC(top)}$	Junction-to-case (top) thermal resistance	50.5	128.9	°C/W
$R_{\theta JB}$	Junction-to-board thermal resistance	54.3	153.8	°C/W
ψ_{JT}	Junction-to-top characterization parameter	0.8	11.9	°C/W
ψ_{JB}	Junction-to-board characterization parameter	52.8	157.4	°C/W
$R_{\theta JC(bot)}$	Junction-to-case (bottom) thermal resistance	N/A	N/A	°C/W

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

6.5 Electrical Characteristics

Over the operating temperature range of T_J = –40°C to +125°C, and 1.8 V < V_{DD} < 18 V (unless otherwise noted). Typical values are at T_J = 25°C and V_{DD} = 5 V.

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
$V_{(POR)}$	Power-on reset voltage (1)	V_{OL}max = 0.2 V, output sink current = 15 µA			0.8	V
V_{IT+}	Positive-going input threshold voltage	V_{DD} = 1.8 V	396	400	404	mV
		V_{DD} = 18 V	396	400	404	
$V_{IT–}$	Negative-going input threshold voltage	V_{DD} = 1.8 V	387	394.5	400	mV
		V_{DD} = 18 V	387	394.5	400	
V_{hys}	Hysteresis voltage (hys = V_{IT+} – $V_{IT–}$)			5.5	12	mV
$I_{(SENSE)}$	Input current (at the SENSE pin)	V_{DD} = 1.8 V and 18 V, V_I = 6.5 V	–25	1	25	nA
V_{OL}	Low-level output voltage	V_{DD} = 1.3 V, output sink current = 0.4 mA			250	mV
		V_{DD} = 1.8 V, output sink current = 3 mA			250	
		V_{DD} = 5 V, output sink current = 5 mA			250	
$I_{lkg(OD)}$	Open-drain output leakage-current	V_{DD} = 1.8 V and 18 V, V_O = V_{DD}			300	nA
		V_{DD} = 1.8 V, V_O = 18 V			300	
I_{DD}	Supply current	V_{DD} = 1.8 V, no load		5.5	11	µA
		V_{DD} = 5 V		6	13	
		V_{DD} = 12 V		6	13	
		V_{DD} = 18 V		7	13	
UVLO	Undervoltage lockout (2)	V_{DD} falling	1.3		1.7	V

(1) The lowest supply voltage (V_{DD}) at which output is active; $t_{r(VDD)}$ > 15 µs/V. Below $V_{(POR)}$, the output cannot be determined.
(2) When V_{DD} falls below UVLO, OUT is driven low. The output cannot be determined below $V_{(POR)}$.

6.6 Timing Requirements

over operating temperature range (unless otherwise noted)

			MIN	NOM	MAX	UNIT
$t_{pd(HL)}$	High-to-low propagation delay (1)	V_{DD} = 5 V, 10-mV input overdrive, R_P = 10 kΩ, V_{OH} = 0.9 × V_{DD}, V_{OL} = 400 mV, see Figure 1		18		µs
$t_{pd(LH)}$	Low-to-high propagation delay (1)	V_{DD} = 5 V, 10-mV input overdrive, R_P = 10 kΩ, V_{OH} = 0.9 × V_{DD}, V_{OL} = 400 mV, see Figure 1		29		µs
$t_{d(start)}$	Start-up delay (2)			150		µs

(1) High-to-low and low-to-high refers to the transition at the input pin (SENSE).
(2) During power on, V_{DD} must exceed 1.8 V for at least 150 µs before the output is in a correct state.

6.7 Switching Characteristics

over operating temperature range (unless otherwise noted)

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_r	Output rise time	V_{DD} = 5 V, 10-mV input overdrive, R_P = 10 kΩ, V_O = (0.1 to 0.9) × V_{DD}		2.2		µs
t_f	Output fall time	V_{DD} = 5 V, 10-mV input overdrive, R_P = 10 kΩ, V_O = (0.1 to 0.9) × V_{DD}		0.22		µs

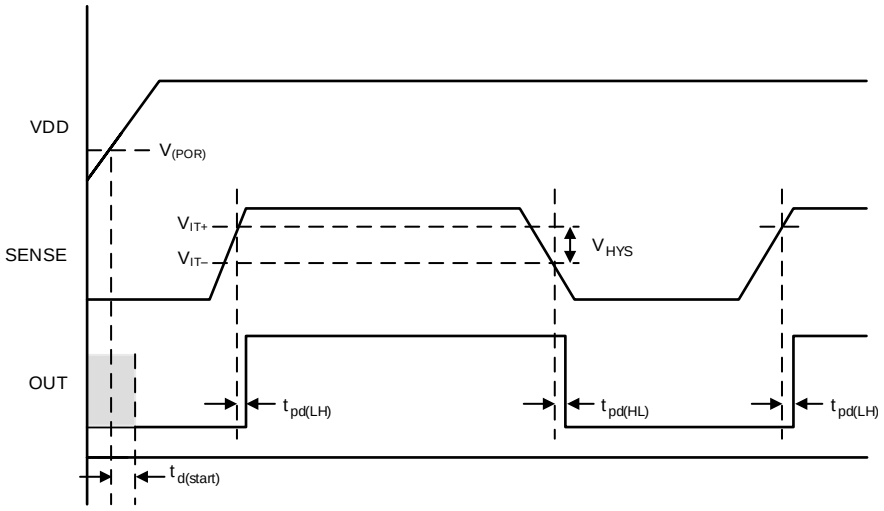


Figure 1. Timing Diagram

6.8 Typical Characteristics

at T_J = 25°C and V_{DD} = 5 V (unless otherwise noted)

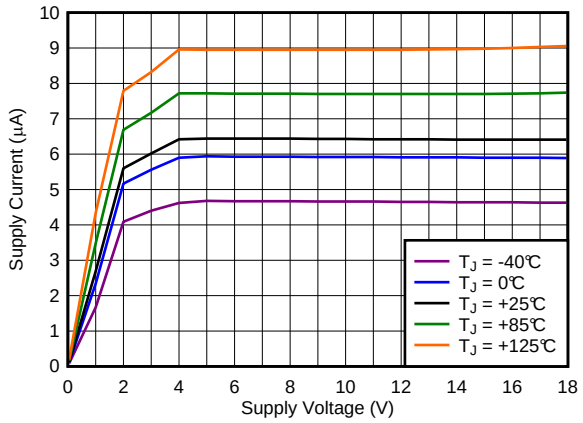


Figure 2. Supply Current (I_{DD}) vs Supply Voltage (V_{DD})

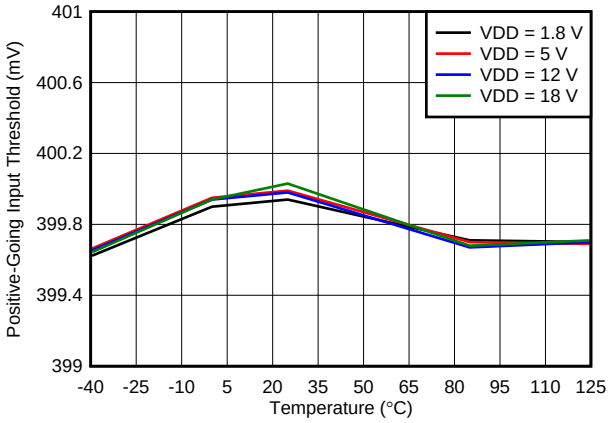


Figure 3. Rising Input Threshold Voltage (V_{IT+}) vs Temperature

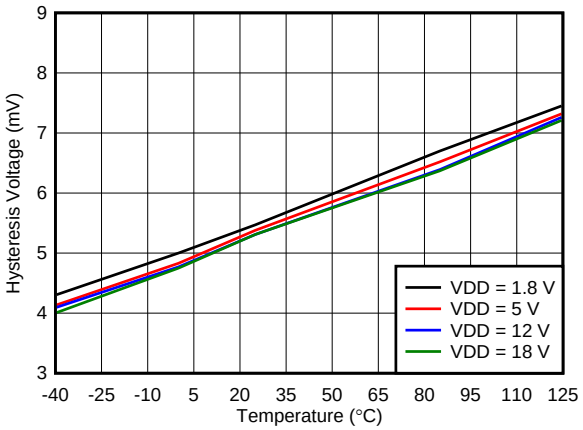


Figure 4. Hysteresis (V_{hys}) vs Temperature

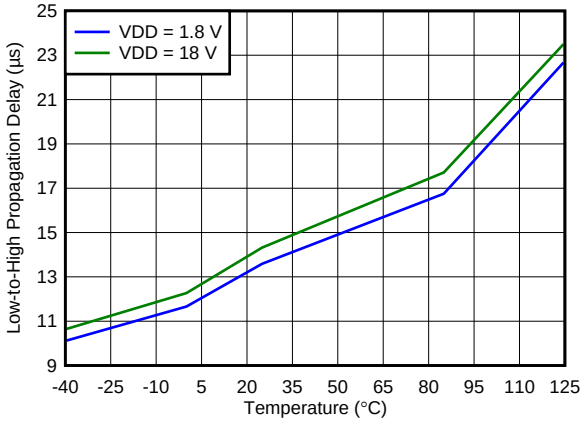


Figure 5. Propagation Delay vs Temperature (High-to-Low Transition at Sense)

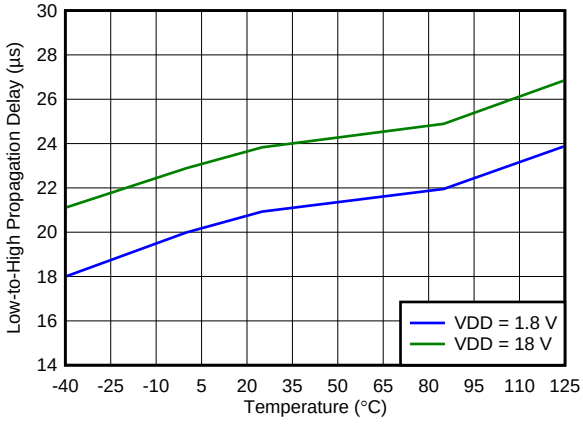


Figure 6. Propagation Delay vs Temperature (Low-to-High Transition at Sense)

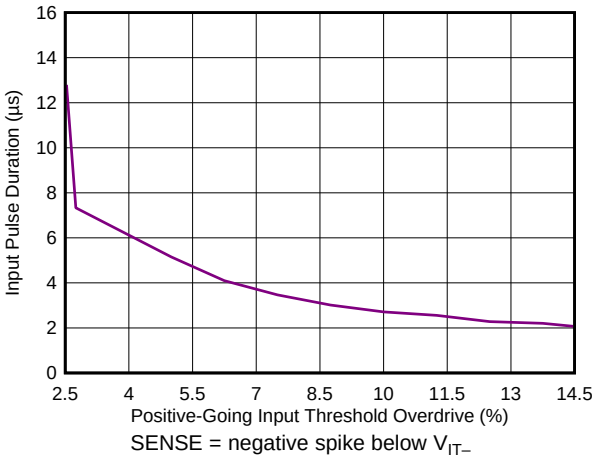


Figure 7. Minimum Pulse Width vs Threshold Overdrive Voltage

Typical Characteristics (continued)

at T_J = 25°C and V_{DD} = 5 V (unless otherwise noted)

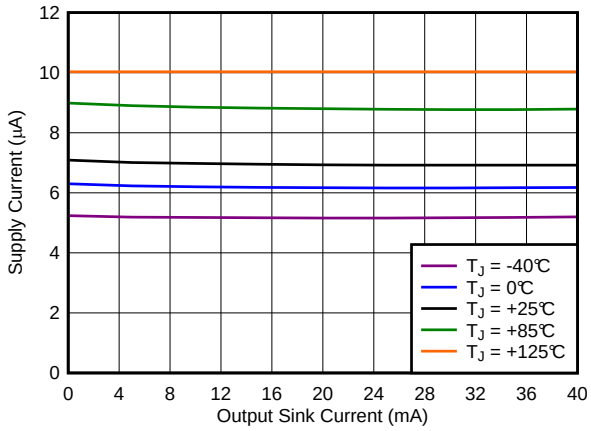


Figure 8. Supply Current (I_{DD}) vs Output Sink Current

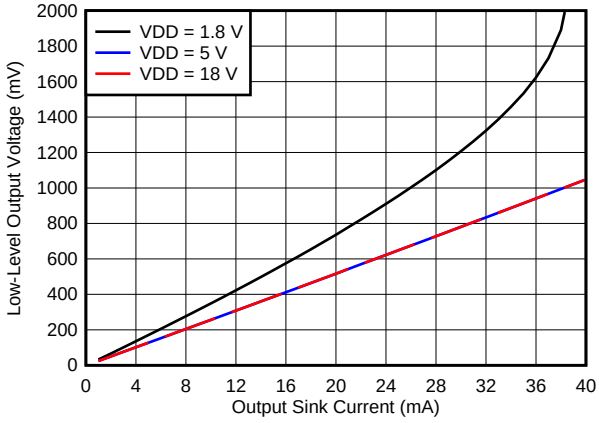


Figure 9. Output Voltage Low (V_{OL}) vs Output Sink Current (–40°C)

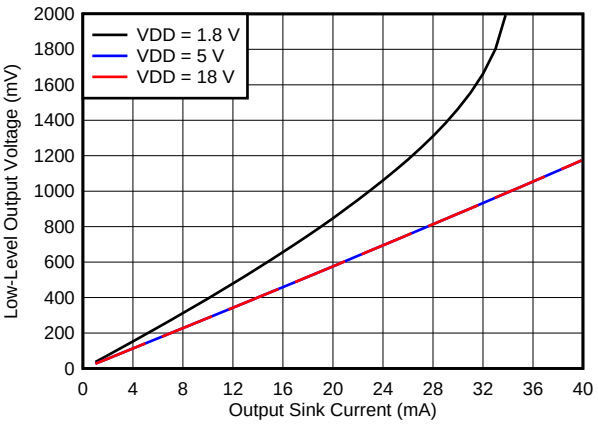


Figure 10. Output Voltage Low (V_{OL}) vs Output Sink Current (0°C)

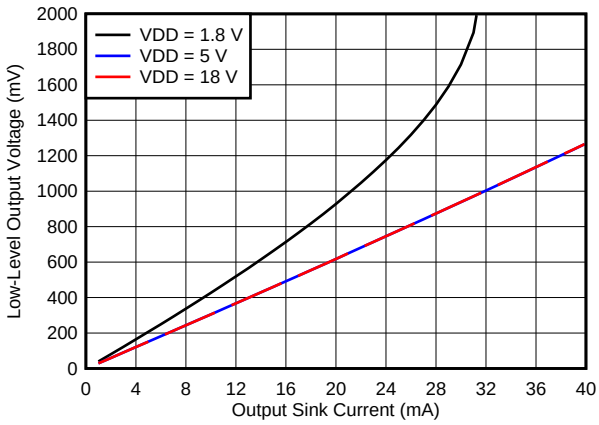


Figure 11. Output Voltage Low (V_{OL}) vs Output Sink Current (25°C)

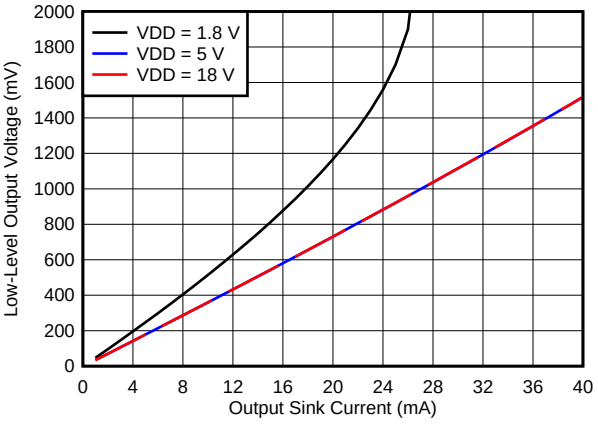


Figure 12. Output Voltage Low (V_{OL}) vs Output Sink Current (85°C)

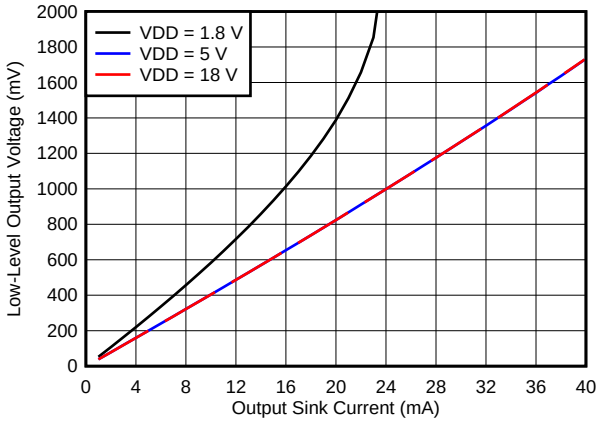


Figure 13. Output Voltage Low (V_{OL}) vs Output Sink Current (125°C)

7 Detailed Description

7.1 Overview

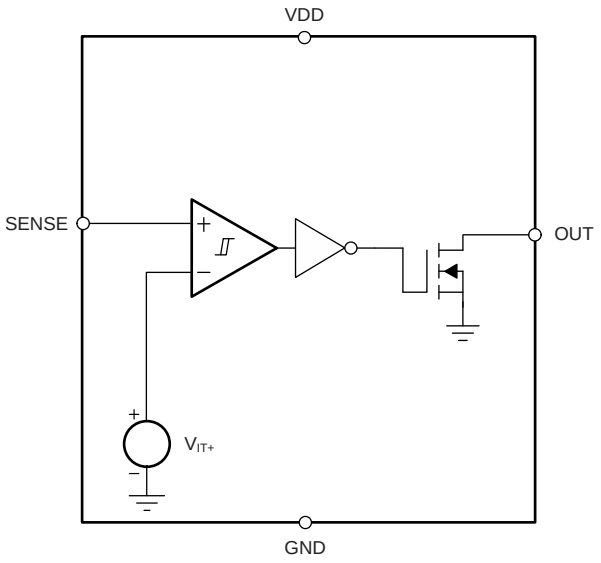
The TPS3710 provides precision voltage detection. The TPS3710 is a wide-supply voltage range (1.8 V to 18 V) device with a high-accuracy rising input threshold of 400 mV (1% over temperature) and built-in hysteresis. The output is also rated to 18 V, and can sink up to 40 mA.

The TPS3710 asserts the output signal, as shown in Table 1. To monitor any voltage above 0.4 V, set the input using an external resistor divider network. Broad voltage thresholds are supported that enable the device for use in a wide array of applications.

Table 1. TPS3710 Truth Table

CONDITION	OUTPUT	STATUS
SENSE > V_{IT+}	OUT high	Output not asserted
SENSE < V_{IT-}	OUT low	Output asserted

7.2 Functional Block Diagram



7.3 Feature Description

7.3.1 Input (SENSE)

The TPS3710 comparator has two inputs: one external input, and one input connected to the internal reference. The comparator rising threshold is trimmed to be equal to the reference voltage (400 mV). The comparator also has a built-in falling hysteresis that makes the device less sensitive to supply-rail noise and provides stable operation.

The comparator input (SENSE) is able to swing from ground to 6.5 V, regardless of the device supply voltage. Although not required in most cases, in order to reduce sensitivity to transients and layout parasitics for extremely noisy applications, place a 1-nF to 10-nF bypass capacitor at the comparator input.

OUT is driven to logic low when the input SENSE voltage drops below (V_{IT-}). When the voltage exceeds V_{IT+}, the output (OUT) goes to a high-impedance state; see Figure 1.

7.3.2 Output (OUT)

In a typical TPS3710 application, the output is connected to a reset or enable input of the processor (such as a digital signal processor [DSP], central processing unit [CPU], field-programmable gate array [FPGA], or application-specific integrated circuit [ASIC]) or the output is connected to the enable input of a voltage regulator (such as a dc-dc converter or low-dropout regulator [LDO]).

The TPS3710 device provides an open-drain output (OUT). Use a pullup resistor to hold this line high when the output goes to high impedance (not asserted). To connect the output to another device at the correct interface-voltage level, connect a pullup resistor to the proper voltage rail. The TPS3710 output can be pulled up to 18 V, independent of the device supply voltage.

Table 1 and the *Input (SENSE)* section describe how the output is asserted or deasserted. See Figure 1 for a timing diagram that describes the relationship between threshold voltage and the respective output.

7.3.3 Immunity to Input-Pin Voltage Transients

The TPS3710 is relatively immune to short voltage transient spikes on the sense pin. Sensitivity to transients depends on both transient duration and amplitude; see Figure 7, *Minimum Pulse Width vs Threshold Overdrive Voltage*.

7.4 Device Functional Modes

7.4.1 Normal Operation (V_{DD} > UVLO)

When the voltage on V_{DD} is greater than 1.8 V for at least 150 µs, the OUT signal correspond to the voltage on SENSE as listed in Table 1.

7.4.2 Undervoltage Lockout ($V_{(POR)} < V_{DD} <$ UVLO)

When the voltage on V_{DD} is less than the device UVLO voltage, and greater than the power-on reset voltage, $V_{(POR)}$, the OUT signal is asserted regardless of the voltage on SENSE.

7.4.3 Power-On Reset ($V_{DD} < V_{(POR)}$)

When the voltage on V_{DD} is lower than the required voltage to internally pull the asserted output to GND ($V_{(POR)}$), SENSE is in a high-impedance state.

8 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.

8.1 Application Information

The TPS3710 device is a wide-supply voltage comparator that operates over a V_{DD} range of 1.8 V to 18 V. The device has a high-accuracy comparator with an internal 400-mV reference and an open-drain output rated to 18 V for precision voltage detection. The device can be used as a voltage monitor. The monitored voltage are set with the use of external resistors.

8.1.1 V_{PULLUP} to a Voltage Other Than V_{DD}

The output is often tied to V_{DD} through a resistor. However, some applications may require the output to be pulled up to a higher or lower voltage than V_{DD} to correctly interface with the reset and enable pins of other devices.

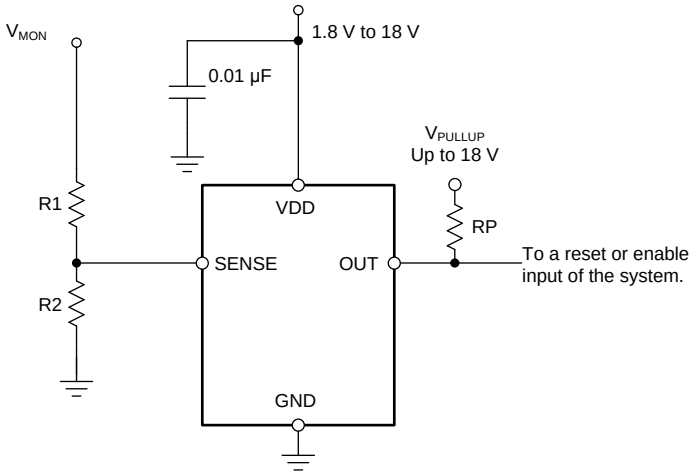


Figure 14. Interfacing to a Voltage Other Than V_{DD}

Application Information (continued)

8.1.2 Monitoring V_{DD}

Many applications monitor the same rail that is powering V_{DD}. In these applications the resistor divider is simply connected to the V_{DD} rail.

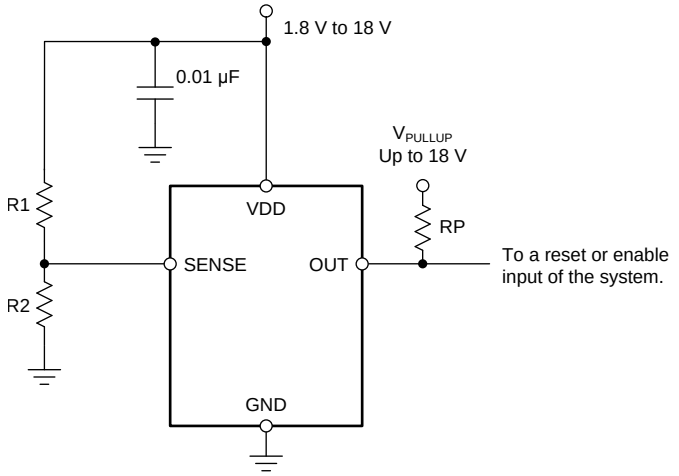
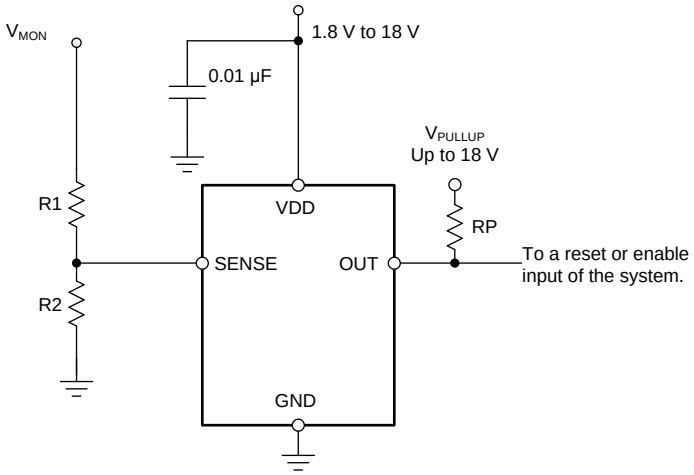


Figure 15. Monitoring the Same Voltage as V_{DD}

8.1.3 Monitoring a Voltage Other Than V_{DD}

Some applications monitor rails other than the one that is powering V_{DD}. In these types of applications the resistor divider used to set the desired threshold is connected to the rail that is being monitored.



NOTE: The input can monitor a voltage greater than maximum V_{DD} with the use of an external resistor divider network.

Figure 16. Monitoring a Voltage Other Than V_{DD}

8.2 Typical Application

The TPS3710 device is a wide-supply voltage comparator that operates over a V_{DD} range of 1.8 to 18 V. The monitored voltage is set with the use of external resistors, so the device can be used either as a precision voltage monitor.

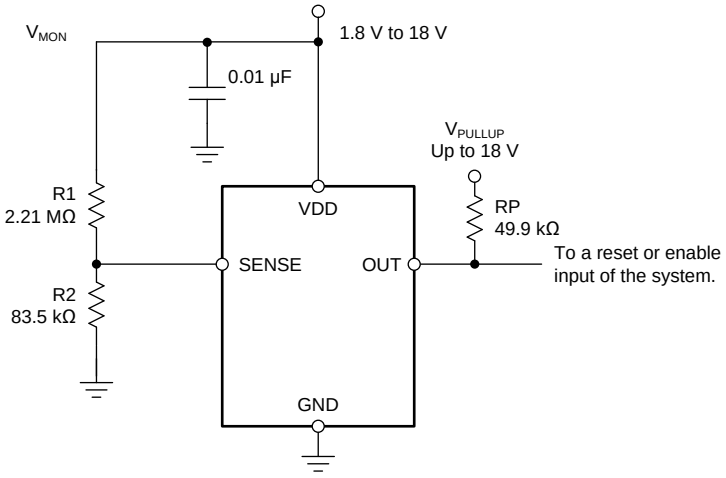


Figure 17. Wide VIN Voltage Monitor

8.2.1 Design Requirements

For this design example, use the values summarized in Table 2 as the input parameters.

Table 2. Design Parameters

PARAMETER	DESIGN REQUIREMENT	DESIGN RESULT
Monitored voltage	12-V nominal rail with maximum falling threshold of 10%	$V_{MON(UV)}$= 10.99 V (8.33%)

8.2.2 Detailed Design Procedure

8.2.2.1 Resistor Divider Selection

The resistor divider values and target threshold voltage can be calculated by using Equation 1 to determine $V_{MON(UV)}$.

$$V_{MON(UV)} = \left(1 + \frac{R1}{R2}\right) \times V_{IT-} \quad (1)$$

where

- R1 and R2 are the resistor values for the resistor divider on the SENSEx pins
- $V_{MON(UV)}$ is the target voltage at which an undervoltage condition is detected

Choose R_{TOTAL} (= R1 + R2) so that the current through the divider is approximately 100 times higher than the input current at the SENSE pin. The resistors can have high values to minimize current consumption as a result of low input bias current without adding significant error to the resistive divider. For details on sizing input resistors, refer to application report SLVA450, *Optimizing Resistor Dividers at a Comparator Input*, available for download from www.ti.com.

8.2.2.2 Pullup Resistor Selection

To ensure the proper voltage level, the pullup resistor value is selected by ensuring that the pullup voltage divided by the resistor does not exceed the sink-current capability of the device. This confirmation is calculated by verifying that the pullup voltage minus the output-leakage current ($I_{lkg(OD)}$) multiplied by the resistor is greater than the desired logic-high voltage. These values are specified in the *Electrical Characteristics* .

Use Equation 2 to calculate the value of the pullup resistor.

$$\frac{(V_{HI} - V_{PU})}{I_{lkg(OD)}} \geq R_{PU} \geq \frac{V_{PU}}{I_O} \quad (2)$$

8.2.2.3 Input Supply Capacitor

Although an input capacitor is not required for stability, for good analog design practice, connect a 0.1-µF low equivalent series resistance (ESR) capacitor across the VDD and GND pins. A higher-value capacitor may be necessary if large, fast rise-time load transients are anticipated, or if the device is not located close to the power source.

8.2.2.4 Sense Capacitor

Although not required in most cases, for extremely noisy applications, place a 1-nF to 10-nF bypass capacitor from the comparator input (SENSE) to the GND pin for good analog design practice. This capacitor placement reduces device sensitivity to transients.

8.2.3 Application Curves

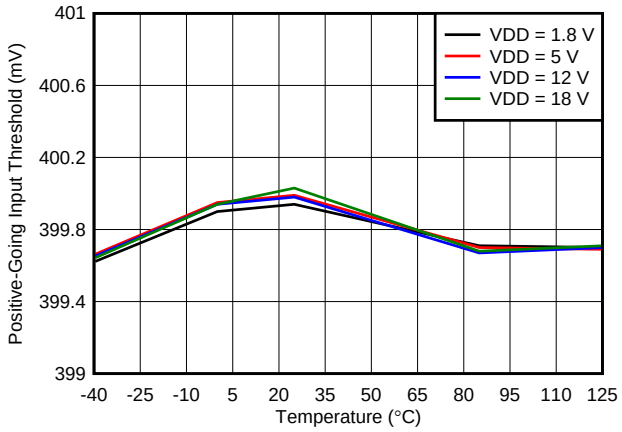


Figure 18. Rising Input Threshold Voltage (V_{IT+}) vs Temperature

8.3 Do's and Don'ts

Do connect a 0.1-µF decoupling capacitor from V_{DD} to GND for best system performance.

If the monitored rail is noisy, do connect a decoupling capacitor from the comparator input (sense) to GND.

Don't use resistors for the voltage divider that cause the current through them to be less than 100 times the input current of the comparator without also accounting for the effect to the accuracy.

Don't use a pullup resistor that is too small, because the larger current sunk by the output then exceeds the desired low-level output voltage (V_{OL}).

9 Power-Supply Recommendations

These devices operate from an input voltage supply range between 1.8 V and 18 V.

10 Layout

10.1 Layout Guidelines

Placing a 0.1-µF capacitor close to the VDD pin to reduce the input impedance to the device is good analog design practice.

10.2 Layout Example

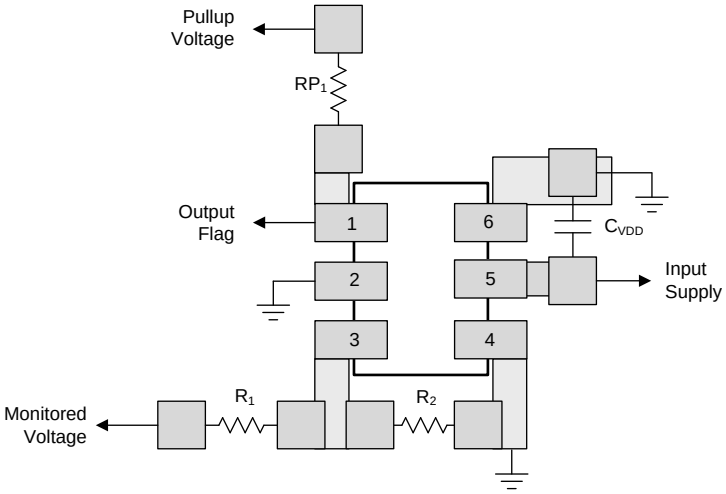


Figure 19. Layout Example

11 器件和文档支持

11.1 器件支持

11.1.1 器件命名规则

Table 3. 器件命名规则

产品	说明
TPS3710**yyyz**	**yyy** 为封装标识符 **z** 为封装数量

11.2 文档支持

11.2.1 相关文档

相关文档如下：

- *优化比较器输入上的电阻分压器*，SLVA450

11.3 社区资源

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.

TI E2E™ Online Community ***TI's Engineer-to-Engineer (E2E) Community.*** Created to foster collaboration among engineers. At e2e.ti.com, you can ask questions, share knowledge, explore ideas and help solve problems with fellow engineers.

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

11.4 Trademarks

E2E is a trademark of Texas Instruments.
All other trademarks are the property of their respective owners.

11.5 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.

11.6 Glossary

SLYZ022 — *TI Glossary*.

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

12 机械、封装和可订购信息

以下页中包括机械、封装和可订购信息。 这些信息是针对指定器件可提供的最新数据。 这些数据会在无通知且不对本文档进行修订的情况下发生改变。 欲获得该数据表的浏览器版本，请查阅左侧的导航栏。

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
TPS3710DDCR	ACTIVE	SOT-23-THIN	DDC	6	3000	RoHS & Green	NIPDAU	Level-2-260C-1 YEAR	-40 to 125	11AO	Samples
TPS3710DDCT	ACTIVE	SOT-23-THIN	DDC	6	250	RoHS & Green	NIPDAU	Level-2-260C-1 YEAR	-40 to 125	11AO	Samples
TPS3710DSER	ACTIVE	WSON	DSE	6	3000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 125	1A	Samples
TPS3710DSET	ACTIVE	WSON	DSE	6	250	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 125	1A	Samples

(1) The marketing status values are defined as follows:
ACTIVE: Product device recommended for new designs.
LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.
NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.
PREVIEW: Device has been announced but is not in production. Samples may or may not be available.
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.

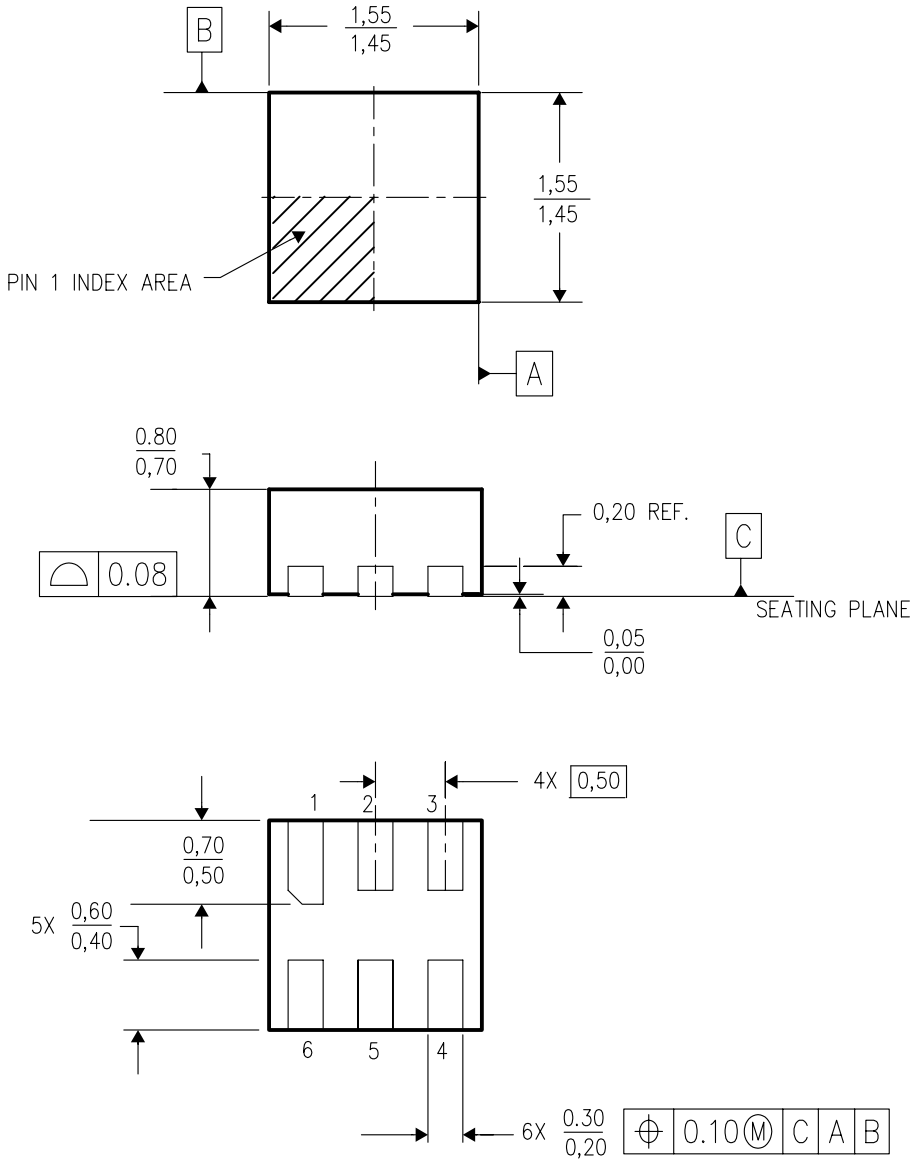
(5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

(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.

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.

DSE (S–PDSO–N6) PLASTIC SMALL OUTLINE



4207810/A 03/06

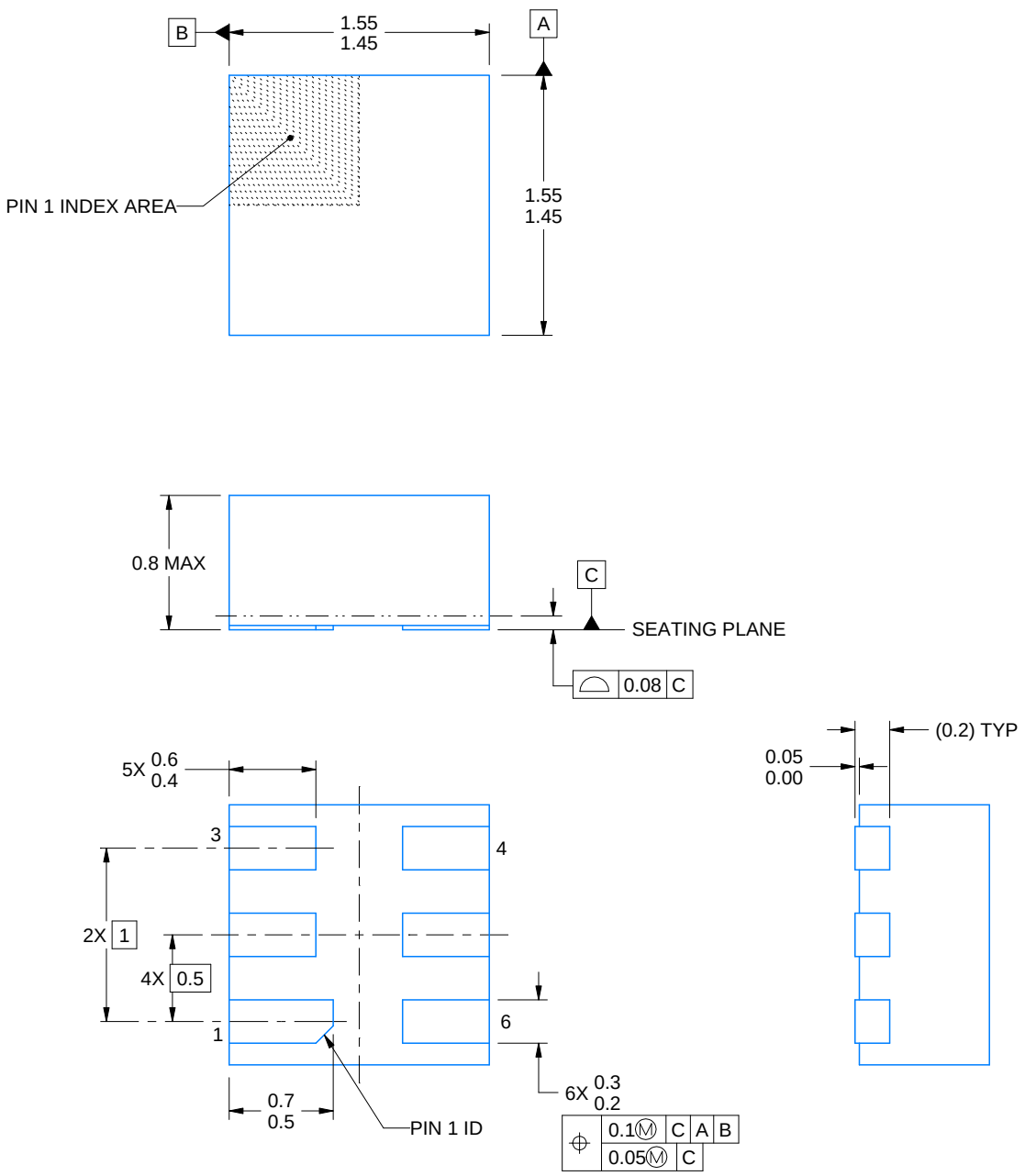
NOTES:
A. All linear dimensions are in millimeters.
B. This drawing is subject to change without notice.
C. Small Outline No–Lead (SON) package configuration.
D. This package is lead–free.

DSE0006A

PACKAGE OUTLINE

WSON - 0.8 mm max height

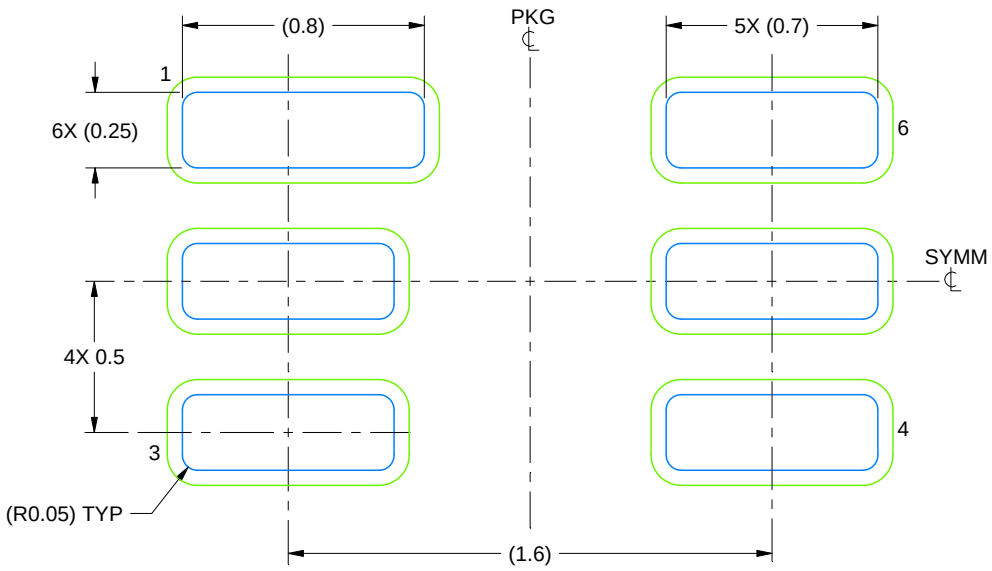
PLASTIC SMALL OUTLINE - NO LEAD



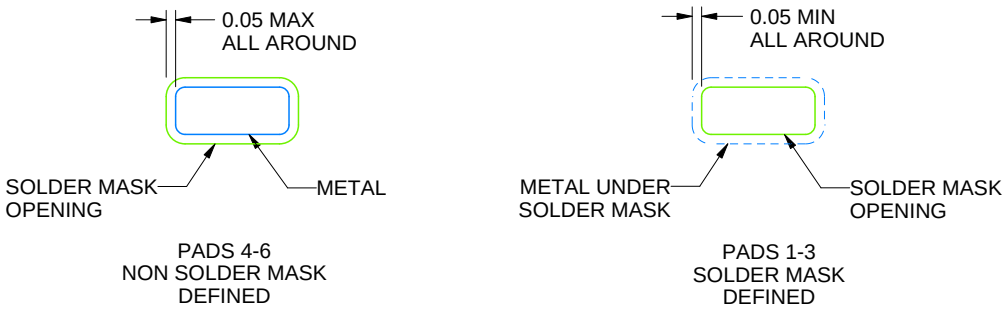
4220552/A 04/2021

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.



LAND PATTERN EXAMPLE
SCALE:40X

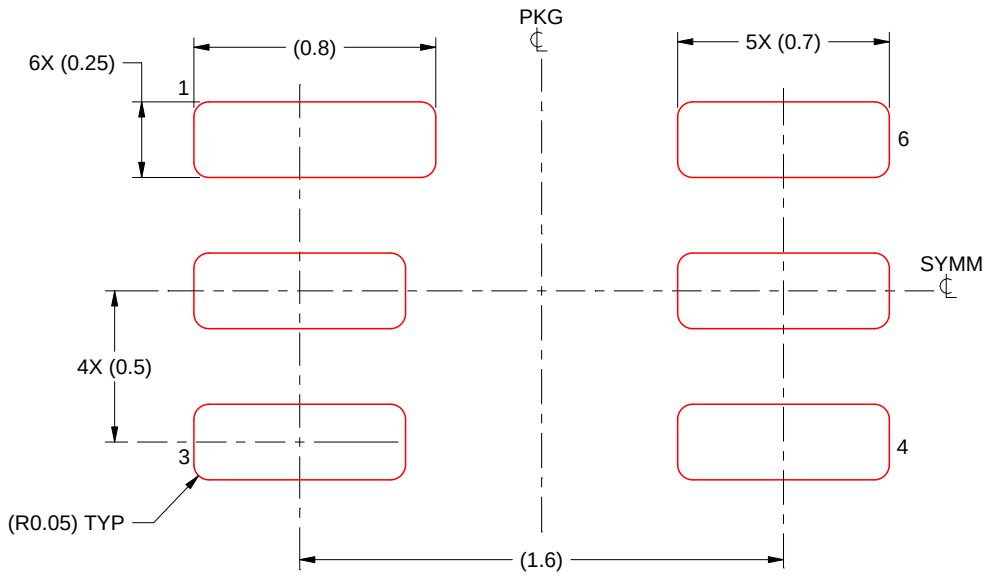


SOLDER MASK DETAILS

4220552/A 04/2021

NOTES: (continued)

3. For more information, see Texas Instruments literature number SLUA271 (www.ti.com/lit/slua271).



SOLDER PASTE EXAMPLE
BASED ON 0.125 mm THICK STENCIL
SCALE:40X

NOTES: (continued)

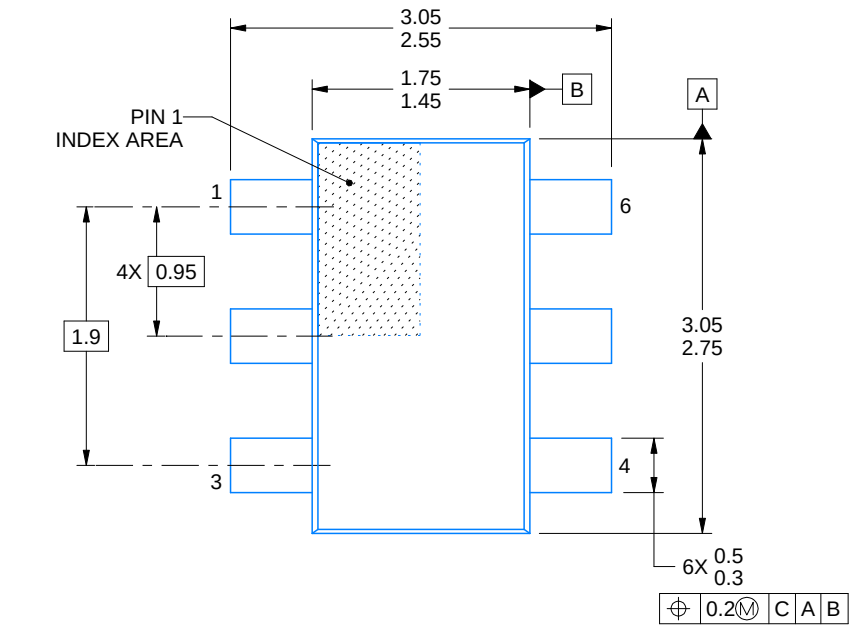
4. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.

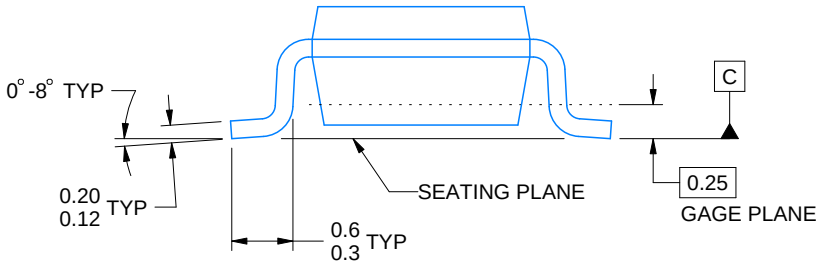
PACKAGE OUTLINE

DDC0006A

SOT-23 - 1.1 max height

SMALL OUTLINE TRANSISTOR

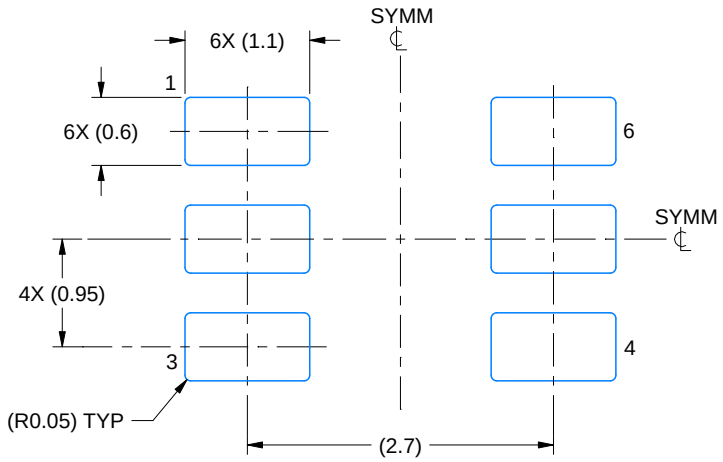




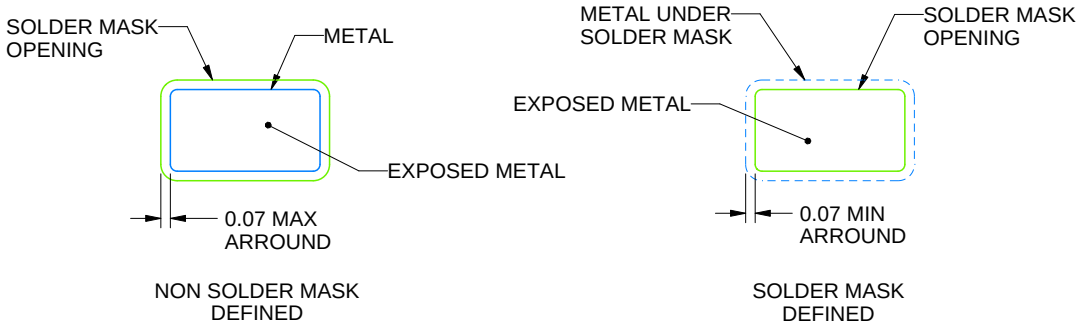
4214841/C 04/2022

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-193.



LAND PATTERN EXAMPLE
EXPLOSED METAL SHOWN
SCALE:15X

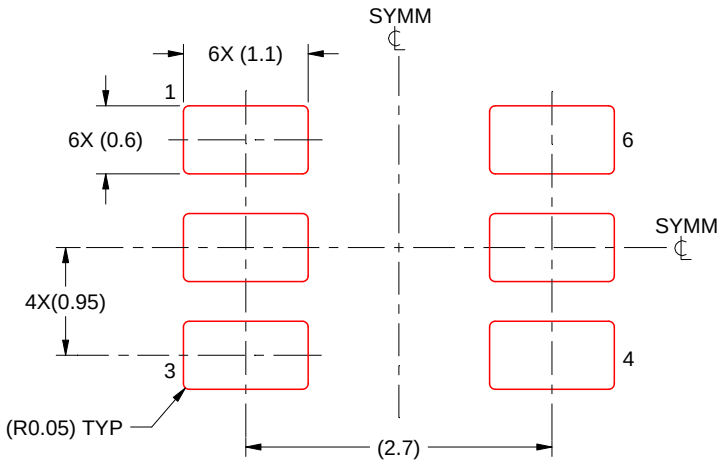


SOLDERMASK DETAILS

4214841/C 04/2022

NOTES: (continued)

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



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

4214841/C 04/2022

NOTES: (continued)

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