



**THE DATASHEET OF  
TLV810ZDBZT**



## 3-Pin Voltage Supervisors with Active-High, Push-Pull Reset

Check for Samples: [TLV810M](#), [TLV810R](#), [TLV810S](#), [TLV810Z](#)

### FEATURES

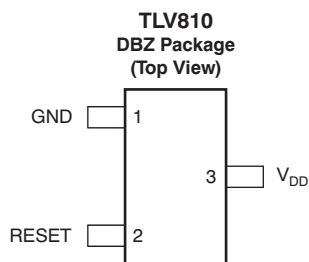
- 3-Pin SOT23 Package
- Supply Current: 9  $\mu$ A (Typical)
- Precision Supply Voltage Monitor: 2.5 V, 3 V, 3.3 V, 5 V
- Power-On Reset Generator with Fixed Delay Time of 200 ms
- Pin-for-Pin Compatible with MAX810
- Temperature Range:  $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$
- Push-Pull, RESET Output

### APPLICATIONS

- DSPs, Microcontrollers, and Microprocessors
- Wireless Communication Systems
- Portable/Battery-Powered Equipment
- Programmable Controls
- Intelligent Instruments
- Industrial Equipment
- Notebook and Desktop Computers
- Automotive Systems

#### DEVICE FAMILY COMPARISON

DEVICE	FUNCTION
<a href="#">TLV803</a>	Open-Drain, $\overline{\text{RESET}}$ Output
<a href="#">TLV809</a>	Push-Pull, $\overline{\text{RESET}}$ Output
<a href="#">TLV810</a>	Push-Pull, RESET Output



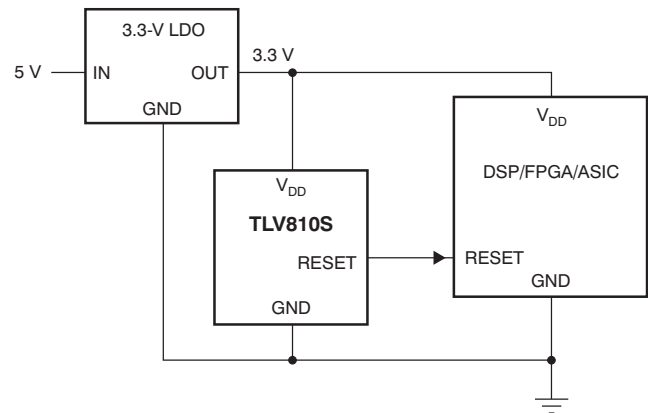
### DESCRIPTION

The [TLV810](#) family of supervisory circuits provides circuit initialization and timing supervision, primarily for DSPs and processor-based systems.

During power-on, RESET is asserted when the supply voltage ( $V_{\text{DD}}$ ) becomes higher than 1.1 V. Thereafter, the supervisory circuit monitors  $V_{\text{DD}}$  and keeps RESET active as long as  $V_{\text{DD}}$  remains below the threshold voltage  $V_{\text{IT}}$ . An internal timer delays the return of the output to the inactive state (low) to ensure proper system reset. The delay time ( $t_{\text{d(typ)}}$  = 200 ms) starts after  $V_{\text{DD}}$  has risen above the threshold voltage,  $V_{\text{IT}}$ . When the supply voltage drops below the  $V_{\text{IT}}$  threshold voltage, the output becomes active (high) again. No external components are required. All the devices in this family have a fixed sense-threshold voltage ( $V_{\text{IT}}$ ) set by an internal voltage divider.

The product spectrum is designed for supply voltages of 2.5 V, 3 V, 3.3 V, and 5 V. The circuits are available in a 3-pin SOT-23 package. The TLV810 devices are characterized for operation over a temperature range of  $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$ .

#### TYPICAL APPLICATION



Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

All trademarks are the property of their respective owners.



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.

### PACKAGE/ORDERING INFORMATION<sup>(1)</sup>

PRODUCT	THRESHOLD VOLTAGE	PACKAGE-LEAD	PACKAGE DESIGNATOR	SPECIFIED OPERATING TEMPERATURE	PACKAGE MARKING	ORDERING INFORMATION	TRANSPORT MEDIA, QUANTITY
TLV810Z	2.25 V	SOT23-3	DBZ	-40°C to +125°C	VOVQ	TLV810ZDBZR	Tape and Reel, 3000
						TLV810ZDBZT	Tape and Reel, 250
TLV810R	2.64 V	SOT23-3	DBZ	-40°C to +125°C	VOWQ	TLV810RDBZR	Tape and Reel, 3000
						TLV810RDBZT	Tape and Reel, 250
TLV810S	2.93 V	SOT23-3	DBZ	-40°C to +125°C	VOXQ	TLV810SDBZR	Tape and Reel, 3000
						TLV810SDBZT	Tape and Reel, 250
TLV810M	4.38 V	SOT23-3	DBZ	-40°C to +125°C	VOYQ	TLV810MDBZR	Tape and Reel, 3000
						TLV810MDBZT	Tape and Reel, 250

(1) For the most current package and ordering information, see the Package Option Addendum at the end of this data sheet, or visit the [device product folders](http://www.ti.com) at [www.ti.com](http://www.ti.com).

### ABSOLUTE MAXIMUM RATINGS<sup>(1)</sup>

Over operating free-air temperature range (unless otherwise noted).

		VALUE		UNIT
		MIN	MAX	
Voltage	$V_{DD}$ <sup>(2)</sup>	0	7	V
	All other pins <sup>(2)</sup>	-0.3	7	V
Current	Maximum low output current, $I_{OL}$		5	mA
	Maximum high output current, $I_{OH}$		-5	mA
	Input clamp current, $I_{IK}$ ( $V_I < 0$ or $V_I > V_{DD}$ )		±20	mA
	Output clamp current, $I_{OK}$ ( $V_O < 0$ or $V_O > V_{DD}$ )		±20	mA
Temperature	Operating free-air temperature range, $T_A$	-40	+125	°C
	Storage temperature range, $T_{stg}$	-65	+150	°C
	Soldering temperature		+260	°C

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

(2) All voltage values are with respect to GND. For reliable operation the device should not be operated at 7 V for more than  $t = 1000$ h continuously.

### THERMAL INFORMATION

THERMAL METRIC <sup>(1)</sup>		TLV810	UNITS
		DBZ	
		3 PINS	
$\theta_{JA}$	Junction-to-ambient thermal resistance	286.9	°C/W
$\theta_{JCTop}$	Junction-to-case (top) thermal resistance	105.6	
$\theta_{JB}$	Junction-to-board thermal resistance	124.4	
$\psi_{JT}$	Junction-to-top characterization parameter	25.8	
$\psi_{JB}$	Junction-to-board characterization parameter	107.9	
$\theta_{JCbott}$	Junction-to-case (bottom) thermal resistance	—	

(1) For more information about traditional and new thermal metrics, see the *IC Package Thermal Metrics* application report, [SPRA953](http://www.ti.com).

## RECOMMENDED OPERATING CONDITIONS

At specified temperature range (unless otherwise noted).

		MIN	MAX	UNIT
$V_{DD}$	Supply voltage	1.1	6	V
$T_A$	Operating free-air temperature range	-40	+125	°C

## ELECTRICAL CHARACTERISTICS

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

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
$V_{OH}$	High-level output voltage	$V_{DD} = 2.0\text{ V to }6\text{ V}, I_{OH} = -500\text{ }\mu\text{A}$	$V_{DD} - 0.2$			V
		$V_{DD} = 3.3\text{ V}, I_{OH} = -2\text{ mA}$	$V_{DD} - 0.4$			
		$V_{DD} = 6\text{ V}, I_{OH} = -4\text{ mA}, T_A = -40^\circ\text{C to }+85^\circ\text{C}$	$V_{DD} - 0.4$			
		$V_{DD} = 6\text{ V}, I_{OH} = -4\text{ mA}, T_A = +85^\circ\text{C to }+125^\circ\text{C}$	$V_{DD} - 0.5$			
$V_{OL}$	Low-level output voltage	$V_{DD} = 2.5\text{ V to }6\text{ V}, I_{OL} = 500\text{ }\mu\text{A}$	0.2			V
		$V_{DD} = 3.3\text{ V}, I_{OL} = 2\text{ mA}$	0.4			
		$V_{DD} = 6\text{ V}, I_{OL} = 4\text{ mA}$	0.4			
Power-up reset voltage <sup>(1)</sup>		$V_{OH} \geq V_{DD} - 0.2\text{ V}, I_{OH} = -50\text{ }\mu\text{A}$	1.1			V
$V_{IT-}$	Negative-going input threshold voltage <sup>(2)</sup>	TLV810Z	2.20	2.25	2.30	V
		TLV810R	2.58	2.64	2.70	
		TLV810S	2.87	2.93	2.99	
		TLV810M	4.28	4.38	4.48	
$V_{hys}$	Hysteresis	$I_{OH} = -50\text{ }\mu\text{A}, T_A = +25^\circ\text{C}$	30			mV
			35			
			40			
			60			
$I_{DD}$	Supply current	$V_{DD} = 2\text{ V}, \text{output unconnected}$	9			$\mu\text{A}$
		$V_{DD} = 6\text{ V}, \text{output unconnected}$	20			

(1) The lowest supply voltage at which RESET becomes valid.  $t_r, V_{DD} \leq 66.7\text{ ms/V}$ .

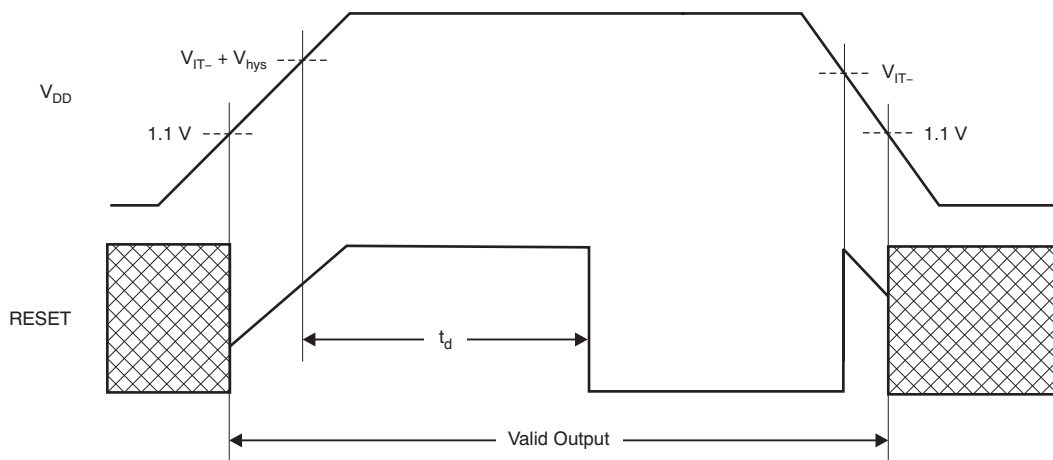
(2) To ensure best stability of the threshold voltage, a bypass capacitor (0.1- $\mu\text{F}$  ceramic) should be placed near the supply terminals.

## SWITCHING CHARACTERISTICS

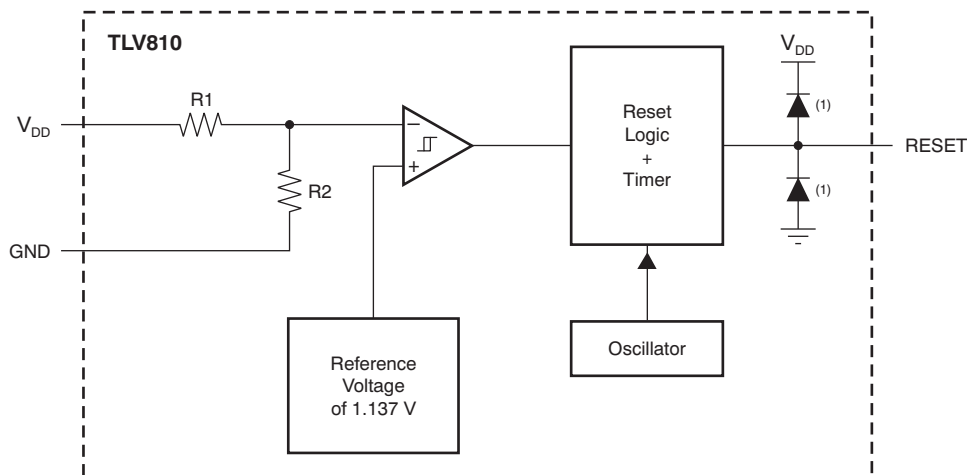
At  $T_A = +25^\circ\text{C}$ , unless otherwise noted.

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
$t_w$	Pulse width at $V_{DD}$	$V_{DD} = 1.08 V_{IT-}$ to $0.92 V_{IT-}$		1		$\mu\text{s}$
$t_d$	Delay time	$V_{DD} \geq V_{IT-} + 0.2 \text{ V}$ ; see <a href="#">Timing Diagram</a>	120	200	280	ms

## TIMING DIAGRAM



## FUNCTIONAL BLOCK DIAGRAM



(1) Parasitic diode.

### TYPICAL CHARACTERISTICS

At  $T_A = +25^\circ\text{C}$ ,  $V_{IT-} = 4.38\text{ V}$ , and  $V_{DD} = 5.0\text{ V}$ , unless otherwise noted.

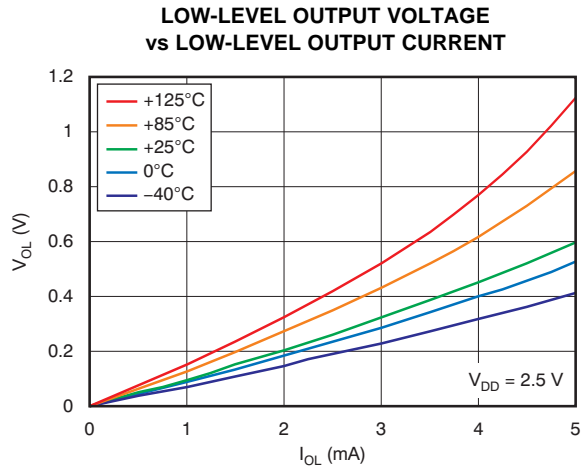


Figure 1.

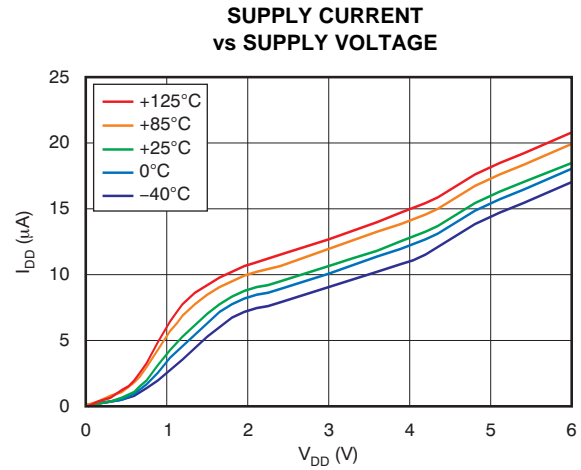


Figure 2.

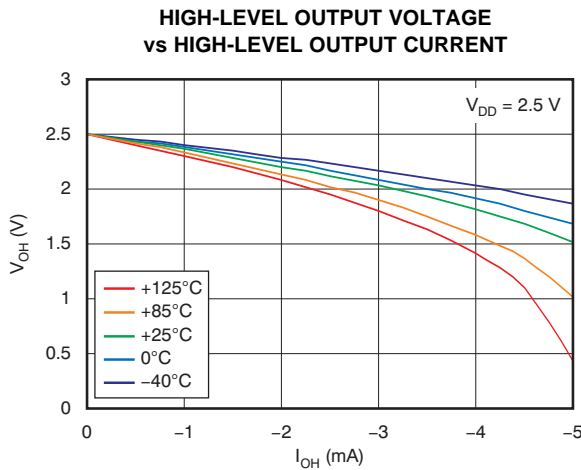


Figure 3.

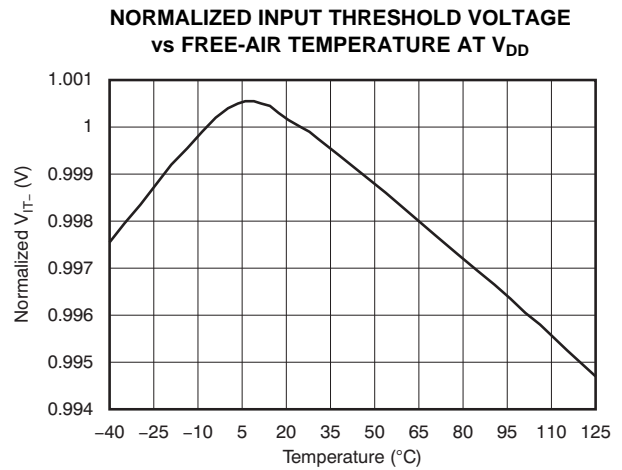


Figure 4.

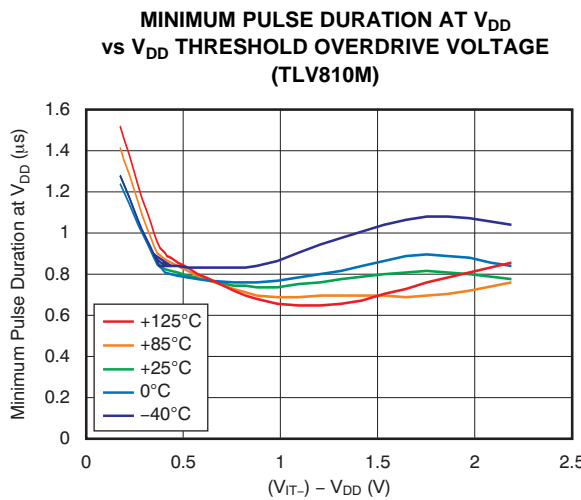


Figure 5.

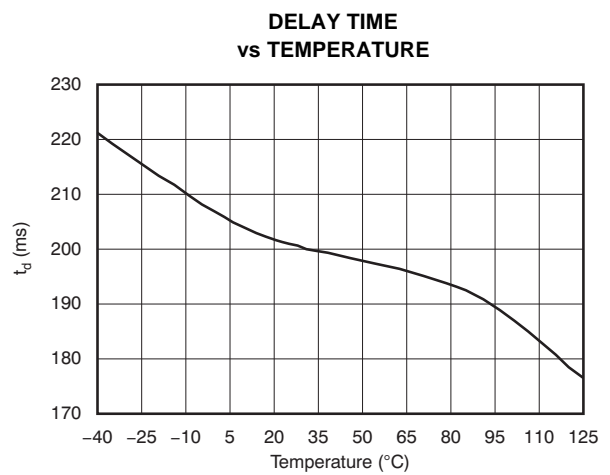


Figure 6.

## APPLICATION INFORMATION

### V<sub>DD</sub> TRANSIENT REJECTION

The TLV810 has built-in rejection of fast transients on the V<sub>DD</sub> pin. The rejection of transients depends on both the duration and the amplitude of the transient. The amplitude of the transient is measured from the bottom of the transient to the negative threshold voltage of the TLV810, as shown in Figure 7.

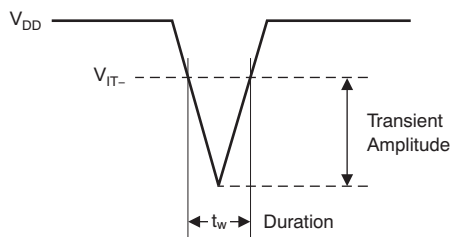


Figure 7. Voltage Transient Measurement

The TLV810 does not respond to transients that are fast duration/low amplitude or long duration/small amplitude. Figure 5 shows the relationship between the transient amplitude and the duration needed to trigger a reset. Any combination of duration and amplitude above the curve generates a reset signal.

### RESET DURING POWER UP/DOWN

The TLV810 output is valid when V<sub>DD</sub> is greater than 1.1 V. When V<sub>DD</sub> is less than 1.1 V, the output is undefined. Figure 8 shows a typical waveform for the power-up sequence.

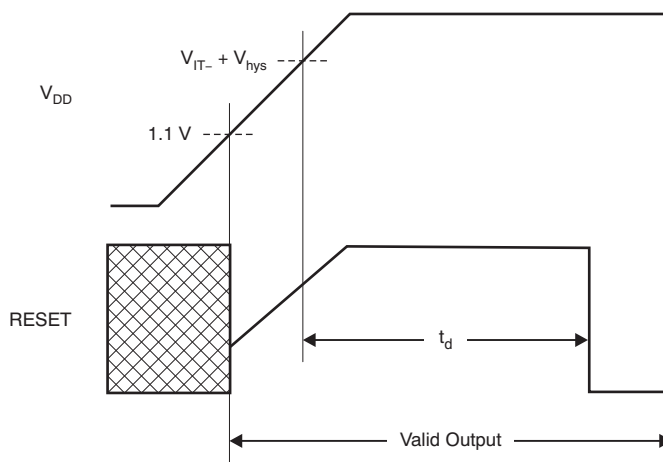
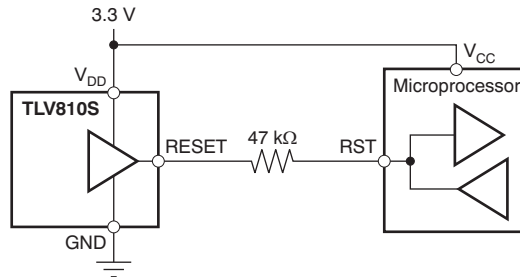


Figure 8. Power-Up Response

## BIDIRECTIONAL RESET PINS

Some microcontrollers have bidirectional reset pins that act as both inputs and outputs. In a situation where both the TLV810 and the microcontroller are attempting to drive the RESET line, a series resistor should be placed between the output of the TLV810 and the RESET pin of the microcontroller to protect against excessive current flow. [Figure 9](#) shows the connection of the TLV810 to a microcontroller using a series resistor to drive a bidirectional RESET line.



**Figure 9. Connection to Bidirectional Reset Pin**

**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
TLV810MDBZR	ACTIVE	SOT-23	DBZ	3	3000	RoHS & Green	NIPDAUAG	Level-1-260C-UNLIM	-40 to 125	VOYQ	<a href="#">Samples</a>
TLV810MDBZT	ACTIVE	SOT-23	DBZ	3	250	RoHS & Green	NIPDAUAG	Level-1-260C-UNLIM	-40 to 125	VOYQ	<a href="#">Samples</a>
TLV810RDBZR	ACTIVE	SOT-23	DBZ	3	3000	RoHS & Green	NIPDAUAG	Level-1-260C-UNLIM	-40 to 125	VOWQ	<a href="#">Samples</a>
TLV810RDBZT	ACTIVE	SOT-23	DBZ	3	250	RoHS & Green	NIPDAUAG	Level-1-260C-UNLIM	-40 to 125	VOWQ	<a href="#">Samples</a>
TLV810ZDBZR	ACTIVE	SOT-23	DBZ	3	3000	RoHS & Green	NIPDAUAG	Level-1-260C-UNLIM	-40 to 125	VOVQ	<a href="#">Samples</a>

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

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

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

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

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

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

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

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

**Green:** TI defines "Green" to mean the content of Chlorine (Cl) and Bromine (Br) based flame retardants meet JS709B low halogen requirements of <=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.

**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.

## TAPE AND REEL INFORMATION



### QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
TLV810MDBZR	SOT-23	DBZ	3	3000	179.0	8.4	3.15	2.95	1.22	4.0	8.0	Q3
TLV810MDBZT	SOT-23	DBZ	3	250	179.0	8.4	3.15	2.95	1.22	4.0	8.0	Q3
TLV810RDBZR	SOT-23	DBZ	3	3000	179.0	8.4	3.15	2.95	1.22	4.0	8.0	Q3
TLV810RDBZT	SOT-23	DBZ	3	250	179.0	8.4	3.15	2.95	1.22	4.0	8.0	Q3
TLV810ZDBZR	SOT-23	DBZ	3	3000	179.0	8.4	3.15	2.95	1.22	4.0	8.0	Q3

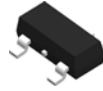
## TAPE AND REEL BOX DIMENSIONS



\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
TLV810MDBZR	SOT-23	DBZ	3	3000	200.0	183.0	25.0
TLV810MDBZT	SOT-23	DBZ	3	250	203.0	203.0	35.0
TLV810RDBZR	SOT-23	DBZ	3	3000	200.0	183.0	25.0
TLV810RDBZT	SOT-23	DBZ	3	250	200.0	183.0	25.0
TLV810ZDBZR	SOT-23	DBZ	3	3000	203.0	203.0	35.0

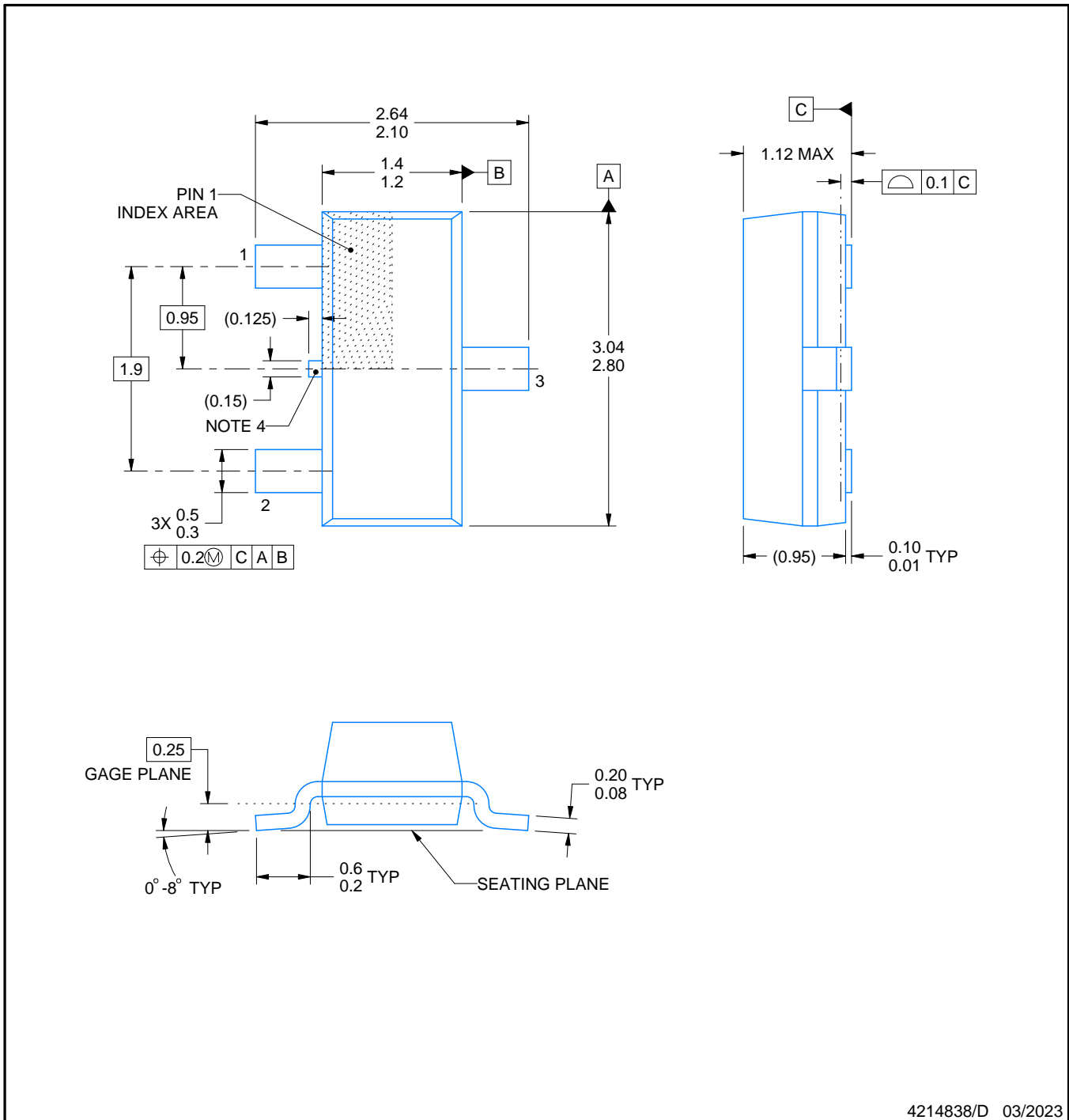
# DBZ0003A



# PACKAGE OUTLINE

## SOT-23 - 1.12 mm max height

SMALL OUTLINE TRANSISTOR



4214838/D 03/2023

### NOTES:

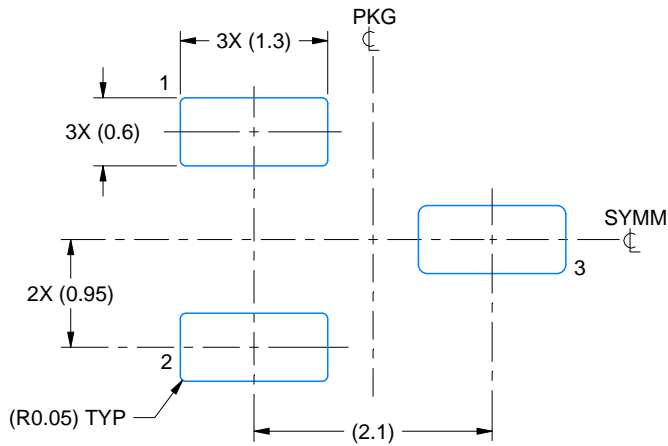
1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. Reference JEDEC registration TO-236, except minimum foot length.
4. Support pin may differ or may not be present.

# EXAMPLE BOARD LAYOUT

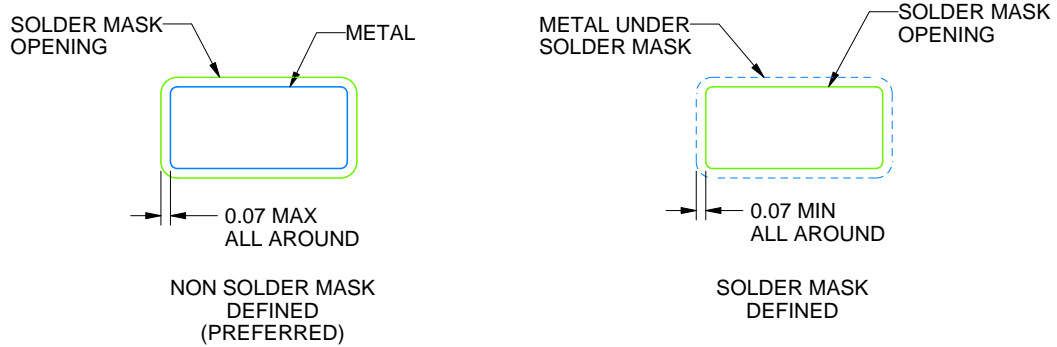
DBZ0003A

SOT-23 - 1.12 mm max height

SMALL OUTLINE TRANSISTOR



LAND PATTERN EXAMPLE  
SCALE:15X



SOLDER MASK DETAILS

4214838/D 03/2023

NOTES: (continued)

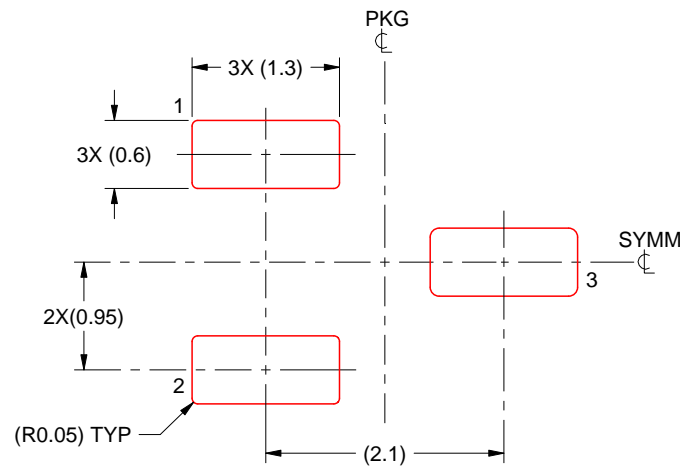
4. Publication IPC-7351 may have alternate designs.
5. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

# EXAMPLE STENCIL DESIGN

DBZ0003A

SOT-23 - 1.12 mm max height

SMALL OUTLINE TRANSISTOR



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

4214838/D 03/2023

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.

## IMPORTANT NOTICE AND DISCLAIMER

TI PROVIDES TECHNICAL AND RELIABILITY DATA (INCLUDING DATA SHEETS), DESIGN RESOURCES (INCLUDING REFERENCE DESIGNS), APPLICATION OR OTHER DESIGN ADVICE, WEB TOOLS, SAFETY INFORMATION, AND OTHER RESOURCES "AS IS" AND WITH ALL FAULTS, AND DISCLAIMS ALL WARRANTIES, EXPRESS AND IMPLIED, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF THIRD PARTY INTELLECTUAL PROPERTY RIGHTS.

These resources are intended for skilled developers designing with TI products. You are solely responsible for (1) selecting the appropriate TI products for your application, (2) designing, validating and testing your application, and (3) ensuring your application meets applicable standards, and any other safety, security, regulatory or other requirements.

These resources are subject to change without notice. TI grants you permission to use these resources only for development of an application that uses the TI products described in the resource. Other reproduction and display of these resources is prohibited. No license is granted to any other TI intellectual property right or to any third party intellectual property right. TI disclaims responsibility for, and you will fully indemnify TI and its representatives against, any claims, damages, costs, losses, and liabilities arising out of your use of these resources.

TI's products are provided subject to [TI's Terms of Sale](#) or other applicable terms available either on [ti.com](https://www.ti.com) or provided in conjunction with such TI products. TI's provision of these resources does not expand or otherwise alter TI's applicable warranties or warranty disclaimers for TI products.

TI objects to and rejects any additional or different terms you may have proposed.

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265  
Copyright © 2024, Texas Instruments Incorporated

## Looking for pricing, stock, or lifecycle information?

Click below to explore more details on WIN SOURCE:

 [View TLV810ZDBZT on WIN SOURCE](#)

 [Texas Instruments](#) Information

## Optimize Your Supply Chain with WIN SOURCE Solutions

-  Global Sourcing Solution
-  Obsolete Management
-  Cost Control Management
-  Shortage Management
-  Alternative Solution
-  Excess Inventory Management