TLV809
3 ピン電圧電源スーパーバイザ

1 特長

- 高精度電源電圧モニタ：2.5V/3V/3.3V/5V
- 200ms の固定遅延時間を持つパワー・オン・リセット・ジェネレータ
- 消費電流：9µA（標準値）
- 温度範囲：–40℃～+85℃
- 3 ピン SOT-23 パッケージ
- MAX809 とピン互換

2 アプリケーション

- ファクトリ・オートメーション
- 携帯型およびバッテリ駆動の機器
- セット・トップ・ボックス
- サーバー
- 家電製品
- 電気メーター
- ビル・オートメーション

3 説明

スーパーバイザ回路の TLV809 ファミリは、主に デジタル信号プロセッサ (DSP) およびプロセッサ・ベースのシステムの回路の初期化とタイミングの監視を行います。新しい TLV809E デバイスは、ピン互換の代替品です。

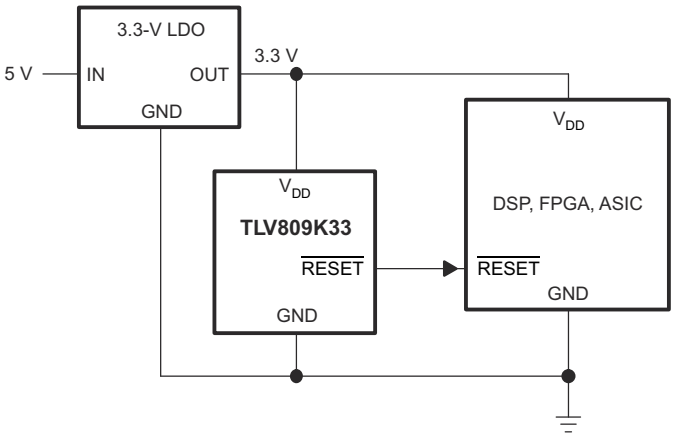
電源オン時に、電源電圧 ($V_{\overline{DD}}$) が 1.1V を超えると RESET がアサートされます。 その後、スーパーバイザ回路は V_{DD} を監視し、 $V_{\overline{DD}}$ がスレッショルド電圧 $V_{\overline{IT}}$ を下回っている限り、 RESET をアクティブに維持します。内蔵されたタイマにより、出力が非アクティブ状態 (high) に戻るのを遅らせて、適切にシステムがリセットされるようにします。遅延時間 ($t_{d(typ)}$ = 200 ms) は、V_{DD} がスレッショルド電圧 (V_{IT}) を上回ると開始します。電源電圧がスレッショルド電圧 (V_{IT}) を下回ると、出力は再びアクティブ (low) になります。外付け部品は不要です。このファミリの全デバイスは、内蔵分圧器で設定した固定検出スレッショルド電圧 (V_{IT}) を持っています。

この製品ファミリは、2.5V、3V、3.3V、5V の電源電圧用に設計されています。これらの回路は 3 ピンの SOT-23 パッケージで供給されます。このデバイスは、-40℃～+85℃ の温度範囲で動作が規定されています。

製品情報

型番	パッケージ (1)	本体サイズ (公称)
TLV809	SOT-23 (3) (DBV)	2.90mm × 1.60mm
	SOT-23 (3) (DBZ)	2.92mm×1.30mm

(1) 提供されている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。



代表的なアプリケーション

英語版の TI 製品についての情報を翻訳したこの資料は、製品の概要を確認する目的で便宜的に提供しているものです。該当する正式な英語版の最新情報は、www.ti.com で閲覧でき、その内容が常に優先されます。TI では翻訳の正確性および妥当性につきましては一切保証いたしません。実際の設計などの前には、必ず最新版の英語版をご参照くださいますようお願いいたします。

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4 Revision History

Changes from Revision E (November 2020) to Revision F (December 2020) — **Page**

- Corrected missed change of VDD from 7 to 6.5 in *Absolute Maximum Ratings* for all other pins and in note2 ... 5

Changes from Revision D (March 2016) to Revision E (November 2020) — **Page**

- 文書全体にわたって表、図、相互参照の採番方法を更新 ... 1
- 「説明」セクションを更新 ... 1
- Updated *Device Comparison* ... 4
- Changed VDD from 7 to 6.5 in *Absolute Maximum Ratings* ... 5
- Changed V_{OL} @ 500µA from 0.2 to 0.3 in *Electrical Characteristics* ... 6
- Changed t_w pulse duration from 3 to 10µs in *Timing Requirements* ... 6
- Changed t_{PHL} from 1 to 10µs in *Switching Characteristics* ... 6
- Deleted figure for Minimum Pulse Duration At V_{DD} in Typical Characteristics ... 8
- Changed figure from Pulse Duration to V_{OL}, I_{OL} in the Typical Application Section ... 11

Changes from Revision C (February 2012) to Revision D (March 2016) — **Page**

- 「*製品情報*」表、「*ピン構成および機能*」セクション、「*ESD 定格*」表、「*概要*」セクション、「*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*」セクションを追加。 ... 1
- ページ 1 からピン配置図を削除 ... 1
- 「*説明*」セクションを変更： 3 番目の段落を追加し、セクションの表現を明確にするよう変更 ... 1
- Deleted soldering temperature parameter from *Absolute Maximum Ratings* table ... 5
- Changed I_{DD} parameter test conditions in *Electrical Characteristics* table ... 6

Changes from Revision B (September 2010) to Revision C (February 2012) — **Page**

- Updated ordering information ... 4

Changes from Revision A (July 2010) to Revision B (September 2010) — **Page**

- 現行基準に合わせ文書形式を更新 ... 1

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- ピン配置図に DBZ パッケージを追加
- Added *Thermal Information* table
- Changed 図 7-3

5 Device Comparison

表 5-1. Device Threshold Options

PRODUCT	THRESHOLD VOLTAGE
TLV809J25	2.25 V
TLV809L30	2.64 V
TLV809K33	2.93 V
TLV809I50	4.55 V

表 5-2. Device Family Comparison

DEVICE	FUNCTION
TLV803	Open-Drain, $\overline{\text{RESET}}$ Output
TLV809	Push-Pull, $\overline{\text{RESET}}$ Output
TLV810	Push-Pull, RESET Output

6 Pin Configuration and Functions

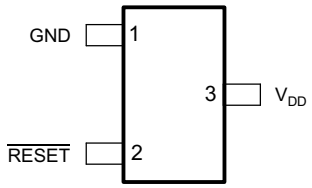


図 6-1. DBV, DBZ Packages
3-Pin SOT-23
Top View

Pin Functions

PIN		I/O	DESCRIPTION
NO.	NAME		
1	GND	—	Ground pin. This pin must be connected to ground with a low-impedance connection.
2	$\overline{\text{RESET}}$	O	$\overline{\text{RESET}}$ pin. $\overline{\text{RESET}}$ is an active low signal, asserting when V_{DD} is below the threshold voltage. When V_{DD} rises above V_{IT}, there is a delay time (t_d) until $\overline{\text{RESET}}$ deasserts. $\overline{\text{RESET}}$ is a push-pull output stage.
3	V_{DD}	I	Supply voltage pin. A 0.1-µF ceramic capacitor from this pin to ground is recommended to improve stability of the threshold voltage.

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7 Specifications

7.1 Absolute Maximum Ratings

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

		MIN	MAX	UNIT
V_{DD}	Supply voltage(2)		6.5	V
	All other pins(2)	–0.3	6.5	
I_{OL}	Maximum low output current		5	mA
I_{OH}	Maximum high output current		–5	mA
I_{IK}	Input clamp current (V_I < 0 or V_I > V_{DD})		±20	mA
I_{OK}	Output clamp current (V_O < 0 or V_O > V_{DD})		±20	mA
T_A	Operating free-air temperature	–40	85	°C
T_{stg}	Storage temperature	–65	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.
(2) All voltage values are with respect to GND. For reliable operation, do not operate the device at 6.5 V for more than t = 1000h continuously.

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)	±500	

(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

at specified temperature range (unless otherwise noted)

		MIN	NOM	MAX	UNIT
V_{DD}	Supply voltage	2		6	V
C_{IN}	V_{DD} bypass capacitor		0.1		µF
T_A	Operating free-air temperature range	–40		85	°C

7.4 Thermal Information

THERMAL METRIC(1)		TLV809		UNIT
		DBV (SOT-23)	DBZ (SOT-23)	
		3 PINS	3 PINS	
$R_{\theta JA}$	Junction-to-ambient thermal resistance	242.1	286.9	°C/W
$R_{\theta JC(top)}$	Junction-to-case (top) thermal resistance	213.0	105.6	°C/W
$R_{\theta JB}$	Junction-to-board thermal resistance	123.4	124.4	°C/W
ψ_{JT}	Junction-to-top characterization parameter	45.7	25.8	°C/W
ψ_{JB}	Junction-to-board characterization parameter	130.9	107.9	°C/W
$R_{\theta JC(bot)}$	Junction-to-case (bottom) thermal resistance	—	—	°C/W

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

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7.5 Electrical Characteristics

at T_A = –40°C to +85°C (unless otherwise noted); typical values are at T_A = 25°C

PARAMETER			TEST CONDITIONS	MIN	TYP	MAX	UNIT
V_{OH}	High-level output voltage		V_{DD} = 2.5 V to 6 V, I_{OH} = –500 µA	V_{DD} – 0.2			V
			V_{DD} = 3.3 V, I_{OH} = –2 mA	V_{DD} – 0.4			
			V_{DD} = 6 V, I_{OH} = –4 mA	V_{DD} – 0.4			
V_{OL}	Low-level output voltage		V_{DD} = 2 V to 6 V, I_{OH} = 500 µA			0.3	V
			V_{DD} = 3.3 V, I_{OH} = 2 mA			0.4	
			V_{DD} = 6 V, I_{OH} = 4 mA			0.4	
	Power-up reset voltage[1]		V_{DD} ≥ 1.1 V, I_{OL} = 50 µA			0.2	V
$V_{IT–}$	Negative-going input threshold voltage[2]	TLV809J25	T_A = –40°C to +85°C	2.20	2.25	2.30	V
		TLV809L30		2.58	2.64	2.70	
		TLV809K33		2.87	2.93	2.99	
		TLV809I50		4.45	4.55	4.65	
V_{hys}	Hysteresis	TLV809J25			30		mV
		TLV809L30			35		
		TLV809K33			40		
		TLV809I50			60		
I_{DD}	Supply current		V_{DD} = 2 V, RESET is unconnected		9	12	µA
			V_{DD} = 6 V, RESET is unconnected		20	25	
C_I	Input capacitance		V_I = 0 V to V_{DD}		5		pF

(1) The lowest supply voltage at which $\overline{\text{RESET}}$ becomes active. $t_{r,\ VDD}$ ≥ 15 ms/V.
(2) To ensure best stability of the threshold voltage, place a bypass capacitor (0.1-µF ceramic) near the supply pins.

7.6 Timing Requirements

at T_A = 25°C, R_L = 1 MΩ, and C_L = 50 pF

			MIN	NOM	MAX	UNIT
t_w	Pulse duration at V_{DD}	V_{DD} = $V_{IT–}$ + 0.2 V, V_{DD} = $V_{IT–}$ – 0.2 V	10			µs

7.7 Switching Characteristics

at T_A = 25°C, R_L = 1 MΩ, and C_L = 50 pF

PARAMETER			TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_d	Delay time		V_{DD} ≥ $V_{IT–}$ + 0.2 V; see 図 7-1	120	200	280	ms
t_{PHL}	Propagation (delay) time, high-to-low-level output	V_{DD} to $\overline{\text{RESET}}$ delay	V_{IL} = $V_{IT–}$ – 0.2 V, V_{IH} = $V_{IT–}$ + 0.2 V		10		µs

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7.8 Timing Diagrams

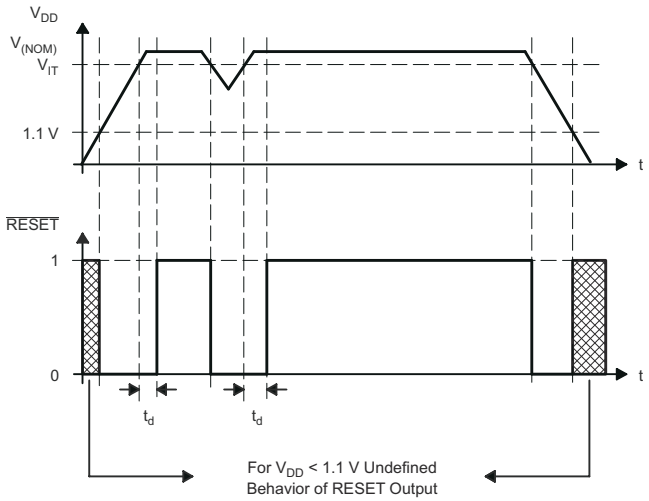


図 7-1. Timing Diagram

7.9 Typical Characteristics

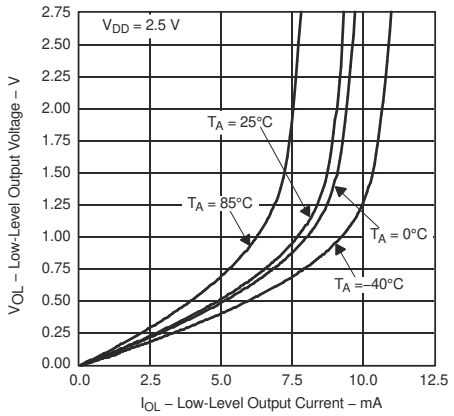


図 7-2. Low-Level Output Voltage vs Low-Level Output Current

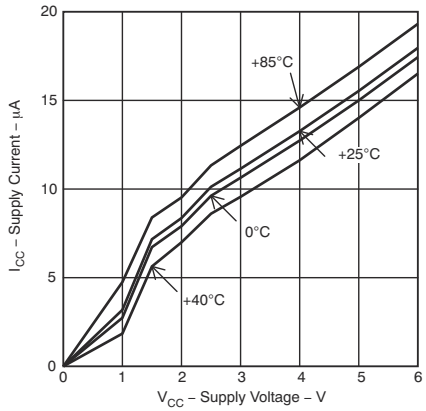


図 7-3. Supply Current vs Supply Voltage

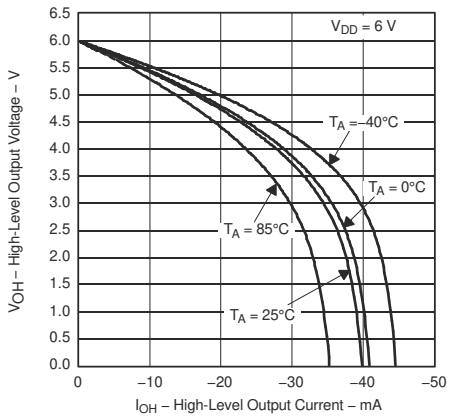


図 7-4. High-Level Output Voltage vs High-Level Output Current

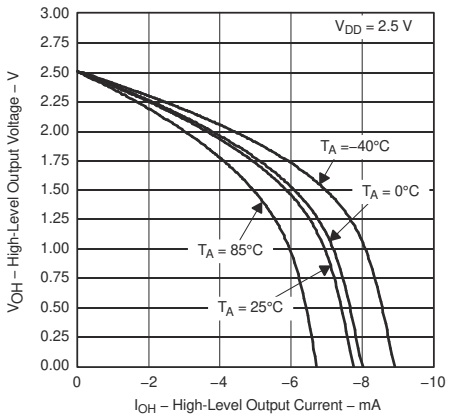


図 7-5. High-Level Output Voltage vs High-Level Output Current

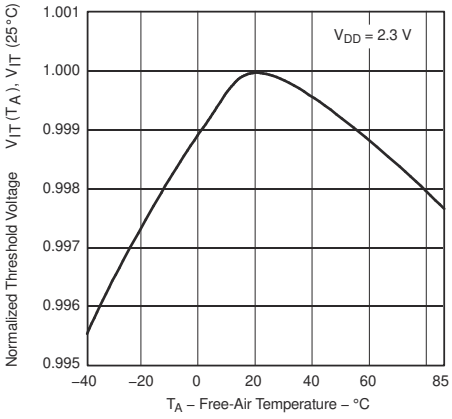


図 7-6. Normalized Input Threshold Voltage vs Free-Air Temperature at V_{DD}

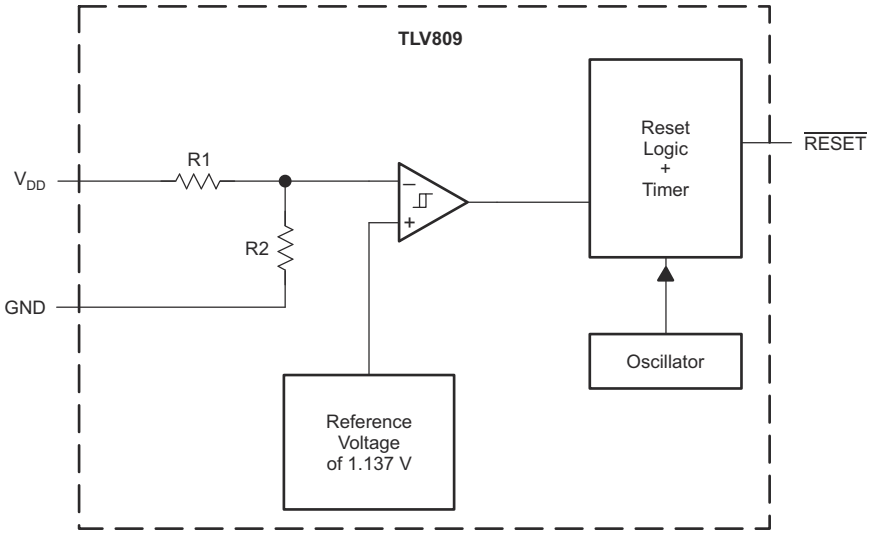
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8 Detailed Description

8.1 Overview

The TLV809 is a 3-pin voltage detector with fixed detection thresholds, an active-low push-pull $\overline{\text{RESET}}$ output, and an internal timer to delay the $\overline{\text{RESET}}$ signal when V_{DD} rises above the threshold voltage.

8.2 Functional Block Diagram



8.3 Feature Description

8.3.1 Supply Voltage Monitoring

The device actively monitors its supply voltage to ensure that the power supply is above a certain voltage threshold.

The device offers various fixed threshold options that are approximately 10% below several standard supply voltages (2.5 V, 3.0 V, 3.3 V, 5.0 V).

8.3.2 $\overline{\text{RESET}}$ Output

The device has a $\overline{\text{RESET}}$ output to indicate the status of the input power supply.

$\overline{\text{RESET}}$ is an active low signal, asserting when V_{DD} is below the threshold voltage. When V_{DD} rises above V_{IT}, there is a delay time (t_d) until $\overline{\text{RESET}}$ deasserts.

$\overline{\text{RESET}}$ is a push-pull output stage.

8.4 Device Functional Modes

When the input supply voltage is in its recommended operating range (2 V to 6 V), the device is in a normal operational mode. In normal operational mode the device monitors V_{DD} for undervoltage detection.

When the input supply is below its recommended operating range, the device is in shutdown mode and therefore tries to assert $\overline{\text{RESET}}$.

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9 Application and Implementation

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9.1 Application Information

9.1.1 V_{DD} Transient Rejection

The device has built-in rejection of fast transients on the V_{DD} 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 device, as shown in 図 9-1.

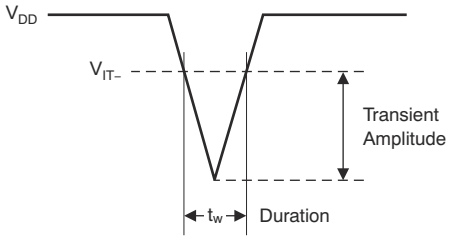


図 9-1. Voltage Transient Measurement

The device does not respond to transients that are fast duration and low amplitude or long duration and small amplitude. Transients meeting or longer than the t_w specified in the セクション 7.6 section triggers a reset.

9.1.2 Reset During Power-Up and Power-Down

The device output is valid when V_{DD} is greater than 1.1 V. When V_{DD} is less than 1.1 V, the output transistor turns off and becomes high impedance. The voltage on the $\overline{\text{RESET}}$ pin rises to the voltage level connected to the pullup resistor. 図 9-2 shows a typical waveform for power-up.

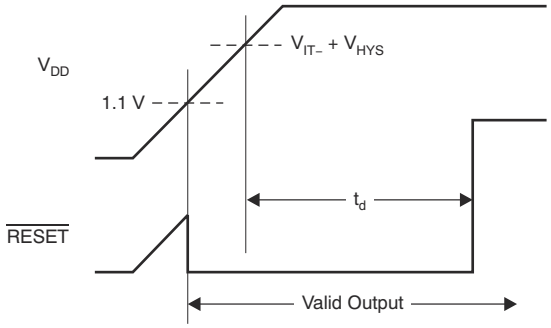


図 9-2. Power-Up Response

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9.2 Typical Application

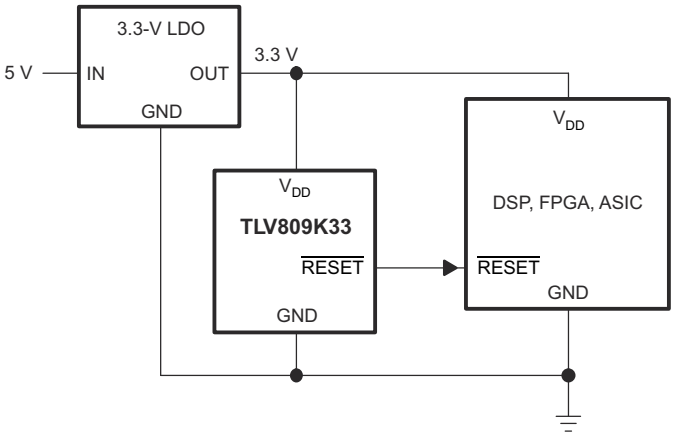


図 9-3. Monitoring a 3.3-V Supply

9.2.1 Design Requirements

The device must ensure that the supply voltage does not drop more than 15% below 3.3 V. If the supply voltage falls below 3.3 V – 15%, then the load must be disabled.

9.2.2 Detailed Design Procedure

The TLV809K33 is selected to ensure that V_{DD} is greater than 2.87 V when the load is enabled.

9.2.3 Application Curve

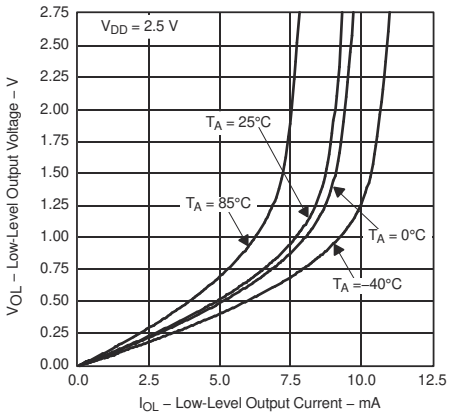


図 9-4. Low-Level Output Voltage vs Low-Level Output Current

10 Power Supply Recommendations

Power the device with a low-impedance supply. A 0.1-µF bypass capacitor from V_{DD} to ground is recommended.

11 Layout

11.1 Layout Guidelines

Place the device near the load for the input power supply, with a low-impedance connection to the power supply pins of the load to sense the supply voltage.

11.2 Layout Example

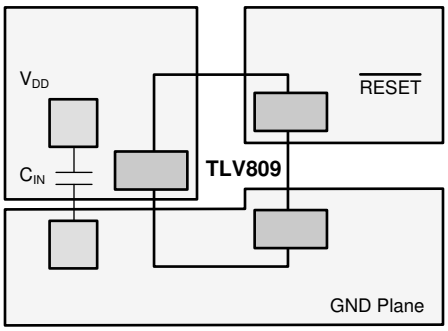


図 11-1. Example Layout

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12 Device and Documentation Support

12.1 Documentation Support

12.1.1 Related Documentation

TLV803 Data Sheet, SBVS157

TLV810 Data Sheet, SBVS158

12.2 サポート・リソース

TI E2E™ サポート・フォーラムは、エンジニアが検証済みの回答と設計に関するヒントをエキスパートから迅速かつ直接得ることができる場所です。既存の回答を検索したり、独自の質問をしたりすることで、設計で必要な支援を迅速に得ることができます。

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12.3 Trademarks

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12.4 静電気放電に関する注意事項



この IC は、ESD によって破損する可能性があります。テキサス・インスツルメンツは、IC を取り扱う際には常に適切な注意を払うことを推奨します。正しい ESD 対策をとらないと、デバイスを破損するおそれがあります。

ESD による破損は、わずかな性能低下からデバイスの完全な故障まで多岐にわたります。精密な IC の場合、パラメータがわずかに変化するだけで公表されている仕様から外れる可能性があるため、破損が発生しやすくなっています。

12.5 用語集

TI 用語集　この用語集には、用語や略語の一覧および定義が記載されています。

13 Mechanical, Packaging, and Orderable Information

The following pages include mechanical, packaging, and orderable information. This information is the most current data available for the designated devices. This data is subject to change without notice and revision of this document. For browser-based versions of this data sheet, refer to the left-hand navigation.

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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)
TLV809I50DBVR	Active	Production	SOT-23 (DBV) | 3	3000 | LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	VTBI
TLV809I50DBVR.A	Active	Production	SOT-23 (DBV) | 3	3000 | LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	VTBI
TLV809I50DBVT	Active	Production	SOT-23 (DBV) | 3	250 | SMALL T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	VTBI
TLV809I50DBVT.A	Active	Production	SOT-23 (DBV) | 3	250 | SMALL T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	VTBI
TLV809I50DBZR	Active	Production	SOT-23 (DBZ) | 3	3000 | LARGE T&R	Yes	NIPDAU | SN	Level-1-260C-UNLIM	-40 to 85	BCMV
TLV809I50DBZR.A	Active	Production	SOT-23 (DBZ) | 3	3000 | LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	BCMV
TLV809I50DBZT	Active	Production	SOT-23 (DBZ) | 3	250 | SMALL T&R	Yes	NIPDAU | SN	Level-1-260C-UNLIM	-40 to 85	BCMV
TLV809I50DBZT.A	Active	Production	SOT-23 (DBZ) | 3	250 | SMALL T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	BCMV
TLV809J25DBVR	Active	Production	SOT-23 (DBV) | 3	3000 | LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	VTCI
TLV809J25DBVR.A	Active	Production	SOT-23 (DBV) | 3	3000 | LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	VTCI
TLV809J25DBVT	Active	Production	SOT-23 (DBV) | 3	250 | SMALL T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	VTCI
TLV809J25DBVT.A	Active	Production	SOT-23 (DBV) | 3	250 | SMALL T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	VTCI
TLV809J25DBZR	Active	Production	SOT-23 (DBZ) | 3	3000 | LARGE T&R	Yes	NIPDAU | SN	Level-1-260C-UNLIM	-40 to 85	BCMT
TLV809J25DBZR.A	Active	Production	SOT-23 (DBZ) | 3	3000 | LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	BCMT
TLV809J25DBZT	Active	Production	SOT-23 (DBZ) | 3	250 | SMALL T&R	Yes	NIPDAU | SN | NIPDAUAG	Level-1-260C-UNLIM	-40 to 85	BCMT
TLV809J25DBZT.A	Active	Production	SOT-23 (DBZ) | 3	250 | SMALL T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	BCMT
TLV809K33DBVR	Active	Production	SOT-23 (DBV) | 3	3000 | LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	VTRI
TLV809K33DBVR.A	Active	Production	SOT-23 (DBV) | 3	3000 | LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	VTRI
TLV809K33DBVT	Active	Production	SOT-23 (DBV) | 3	250 | SMALL T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	VTRI
TLV809K33DBVT.A	Active	Production	SOT-23 (DBV) | 3	250 | SMALL T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	VTRI
TLV809K33DBZR	Active	Production	SOT-23 (DBZ) | 3	3000 | LARGE T&R	Yes	NIPDAU | SN	Level-1-260C-UNLIM	-40 to 85	BCMX
TLV809K33DBZR.A	Active	Production	SOT-23 (DBZ) | 3	3000 | LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	BCMX
TLV809K33DBZT	Active	Production	SOT-23 (DBZ) | 3	250 | SMALL T&R	Yes	NIPDAU | SN	Level-1-260C-UNLIM	-40 to 85	BCMX
TLV809K33DBZT.A	Active	Production	SOT-23 (DBZ) | 3	250 | SMALL T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	BCMX
TLV809L30DBVR	Active	Production	SOT-23 (DBV) | 3	3000 | LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	VTXI
TLV809L30DBVR.A	Active	Production	SOT-23 (DBV) | 3	3000 | LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	VTXI
TLV809L30DBVT	Active	Production	SOT-23 (DBV) | 3	250 | SMALL T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	VTXI
TLV809L30DBVT.A	Active	Production	SOT-23 (DBV) | 3	250 | SMALL T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	VTXI

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)
TLV809L30DBZR	Active	Production	SOT-23 (DBZ) | 3	3000 | LARGE T&R	Yes	NIPDAU | SN	Level-1-260C-UNLIM	-40 to 85	BCMZ
TLV809L30DBZR.A	Active	Production	SOT-23 (DBZ) | 3	3000 | LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	BCMZ
TLV809L30DBZT	Active	Production	SOT-23 (DBZ) | 3	250 | SMALL T&R	Yes	NIPDAU | SN	Level-1-260C-UNLIM	-40 to 85	BCMZ
TLV809L30DBZT.A	Active	Production	SOT-23 (DBZ) | 3	250 | SMALL T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	BCMZ

(1) **Status:** For more details on status, see our product life cycle.

(2) **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.

(3) **RoHS values:** Yes, No, RoHS Exempt. See the TI RoHS Statement for additional information and value definition.

(4) **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.

(5) **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.

(6) **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.

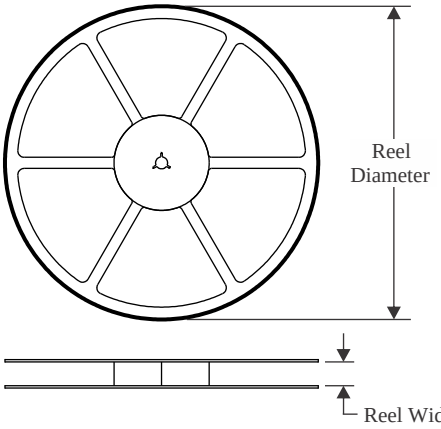
Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

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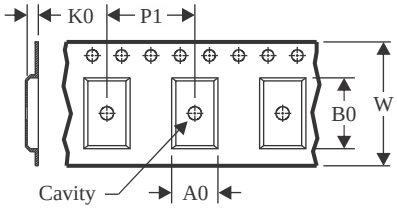
In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

TAPE AND REEL INFORMATION

REEL DIMENSIONS

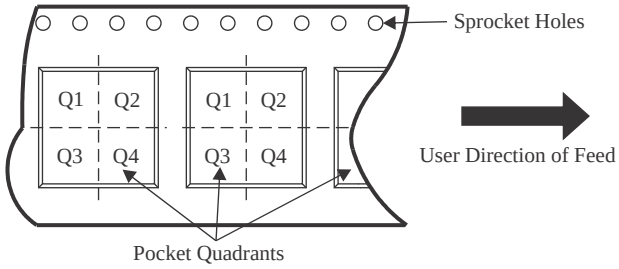


TAPE DIMENSIONS



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

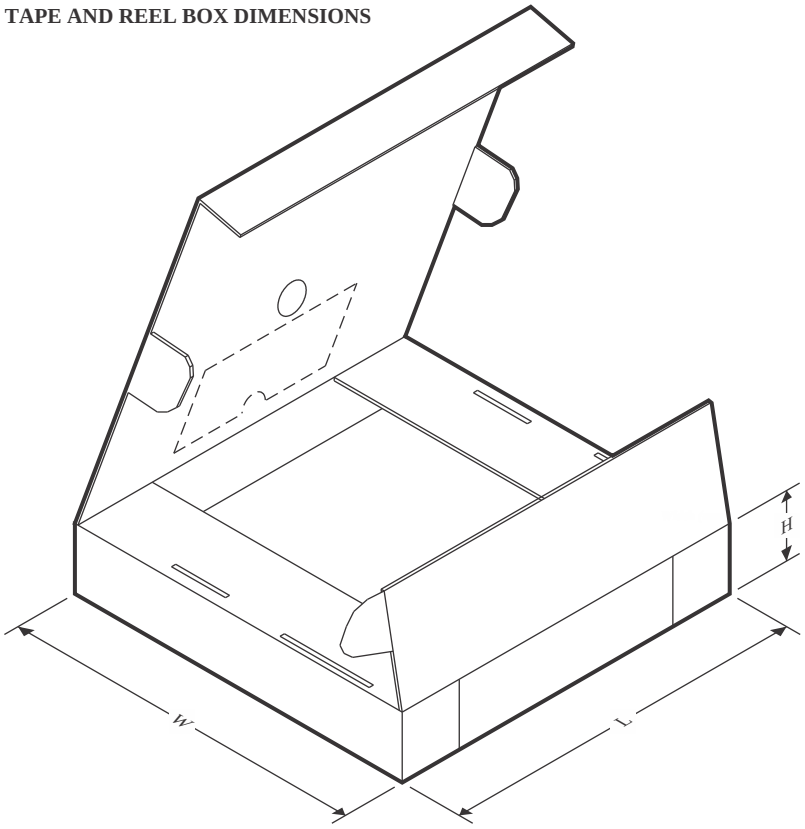


*All dimensions are nominal

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
TLV809I50DBVR	SOT-23	DBV	3	3000	178.0	9.0	3.3	3.2	1.4	4.0	8.0	Q3
TLV809I50DBVT	SOT-23	DBV	3	250	178.0	9.0	3.3	3.2	1.4	4.0	8.0	Q3
TLV809I50DBZR	SOT-23	DBZ	3	3000	180.0	8.4	2.9	3.35	1.35	4.0	8.0	Q3
TLV809I50DBZR	SOT-23	DBZ	3	3000	178.0	9.0	3.15	2.77	1.22	4.0	8.0	Q3
TLV809I50DBZT	SOT-23	DBZ	3	250	178.0	9.0	3.15	2.77	1.22	4.0	8.0	Q3
TLV809I50DBZT	SOT-23	DBZ	3	250	180.0	8.4	2.9	3.35	1.35	4.0	8.0	Q3
TLV809J25DBVR	SOT-23	DBV	3	3000	178.0	9.0	3.3	3.2	1.4	4.0	8.0	Q3
TLV809J25DBVT	SOT-23	DBV	3	250	178.0	9.0	3.3	3.2	1.4	4.0	8.0	Q3
TLV809J25DBZR	SOT-23	DBZ	3	3000	180.0	8.4	2.9	3.35	1.35	4.0	8.0	Q3
TLV809J25DBZT	SOT-23	DBZ	3	250	180.0	8.4	2.9	3.35	1.35	4.0	8.0	Q3
TLV809J25DBZT	SOT-23	DBZ	3	250	178.0	9.0	3.15	2.77	1.22	4.0	8.0	Q3
TLV809K33DBVR	SOT-23	DBV	3	3000	178.0	9.0	3.3	3.2	1.4	4.0	8.0	Q3
TLV809K33DBVT	SOT-23	DBV	3	250	178.0	9.0	3.3	3.2	1.4	4.0	8.0	Q3
TLV809K33DBZR	SOT-23	DBZ	3	3000	180.0	8.4	2.9	3.35	1.35	4.0	8.0	Q3
TLV809K33DBZT	SOT-23	DBZ	3	250	178.0	9.0	3.15	2.77	1.22	4.0	8.0	Q3
TLV809K33DBZT	SOT-23	DBZ	3	250	180.0	8.4	2.9	3.35	1.35	4.0	8.0	Q3

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
TLV809L30DBVR	SOT-23	DBV	3	3000	178.0	9.0	3.3	3.2	1.4	4.0	8.0	Q3
TLV809L30DBVT	SOT-23	DBV	3	250	178.0	9.0	3.3	3.2	1.4	4.0	8.0	Q3
TLV809L30DBZR	SOT-23	DBZ	3	3000	178.0	9.0	3.15	2.77	1.22	4.0	8.0	Q3
TLV809L30DBZR	SOT-23	DBZ	3	3000	180.0	8.4	2.9	3.35	1.35	4.0	8.0	Q3
TLV809L30DBZT	SOT-23	DBZ	3	250	178.0	9.0	3.15	2.77	1.22	4.0	8.0	Q3
TLV809L30DBZT	SOT-23	DBZ	3	250	180.0	8.4	2.9	3.35	1.35	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)
TLV809I50DBVR	SOT-23	DBV	3	3000	180.0	180.0	18.0
TLV809I50DBVT	SOT-23	DBV	3	250	180.0	180.0	18.0
TLV809I50DBZR	SOT-23	DBZ	3	3000	210.0	185.0	35.0
TLV809I50DBZR	SOT-23	DBZ	3	3000	180.0	180.0	18.0
TLV809I50DBZT	SOT-23	DBZ	3	250	180.0	180.0	18.0
TLV809I50DBZT	SOT-23	DBZ	3	250	210.0	185.0	35.0
TLV809J25DBVR	SOT-23	DBV	3	3000	180.0	180.0	18.0
TLV809J25DBVT	SOT-23	DBV	3	250	180.0	180.0	18.0
TLV809J25DBZR	SOT-23	DBZ	3	3000	210.0	185.0	35.0
TLV809J25DBZT	SOT-23	DBZ	3	250	210.0	185.0	35.0
TLV809J25DBZT	SOT-23	DBZ	3	250	180.0	180.0	18.0
TLV809K33DBVR	SOT-23	DBV	3	3000	180.0	180.0	18.0
TLV809K33DBVT	SOT-23	DBV	3	250	180.0	180.0	18.0
TLV809K33DBZR	SOT-23	DBZ	3	3000	210.0	185.0	35.0
TLV809K33DBZT	SOT-23	DBZ	3	250	180.0	180.0	18.0
TLV809K33DBZT	SOT-23	DBZ	3	250	210.0	185.0	35.0
TLV809L30DBVR	SOT-23	DBV	3	3000	180.0	180.0	18.0
TLV809L30DBVT	SOT-23	DBV	3	250	180.0	180.0	18.0

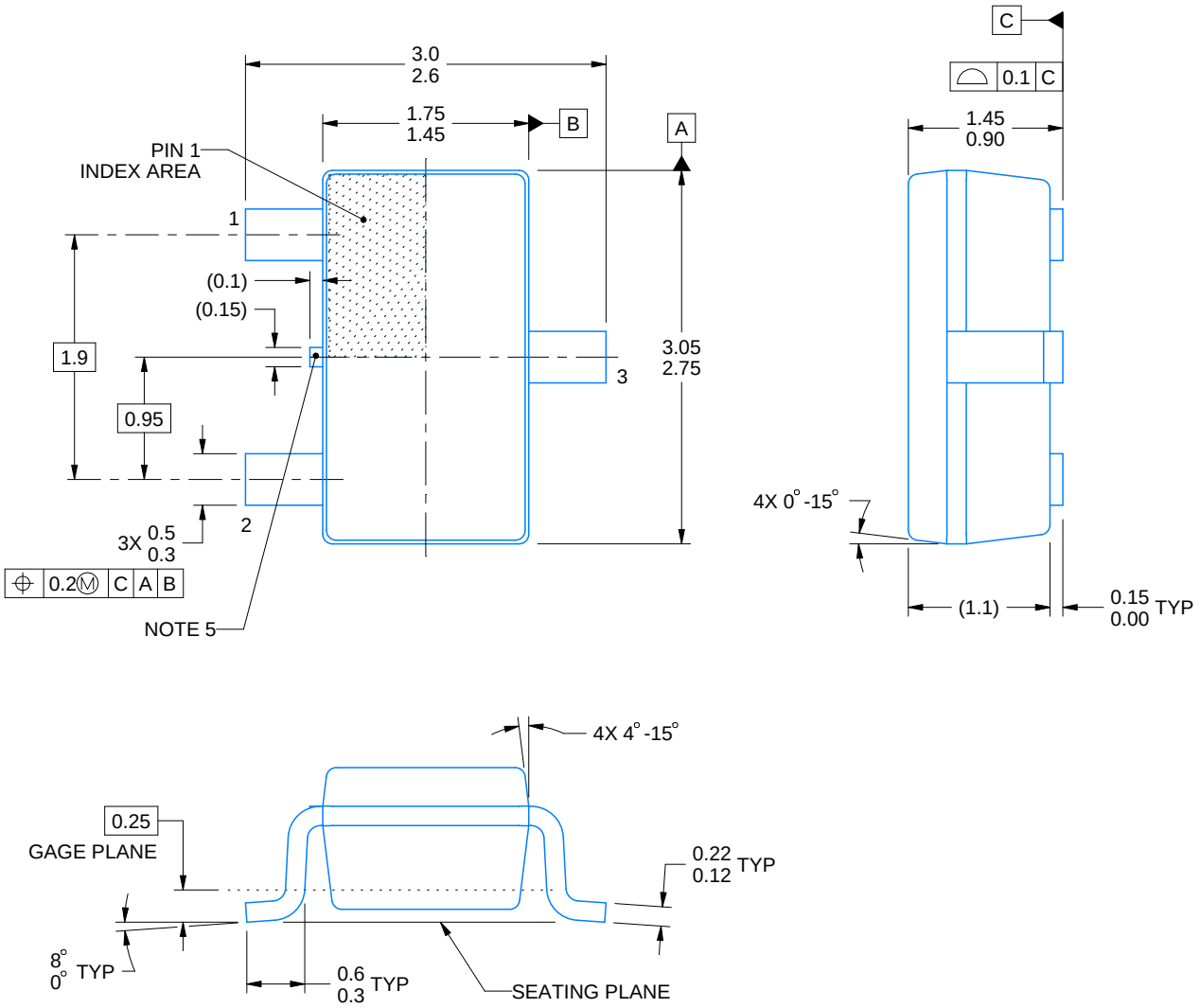
Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
TLV809L30DBZR	SOT-23	DBZ	3	3000	180.0	180.0	18.0
TLV809L30DBZR	SOT-23	DBZ	3	3000	210.0	185.0	35.0
TLV809L30DBZT	SOT-23	DBZ	3	250	180.0	180.0	18.0
TLV809L30DBZT	SOT-23	DBZ	3	250	210.0	185.0	35.0

PACKAGE OUTLINE

DBV0003A

SOT-23 - 1.45 mm max height

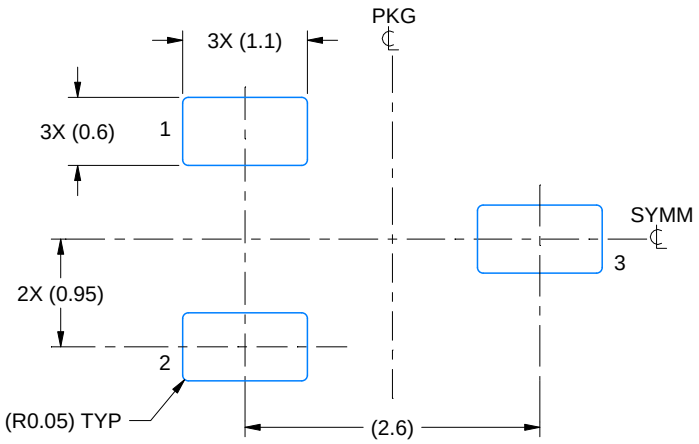
SMALL OUTLINE TRANSISTOR



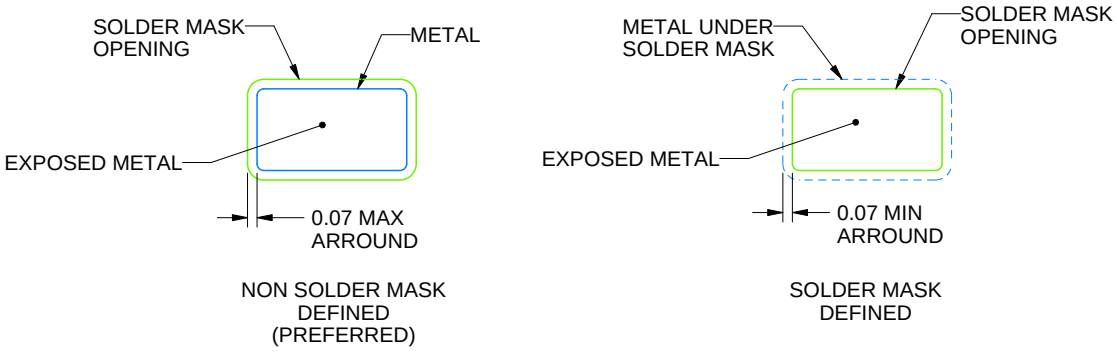
4220743/D 08/2024

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. Refernce 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.



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE:15X

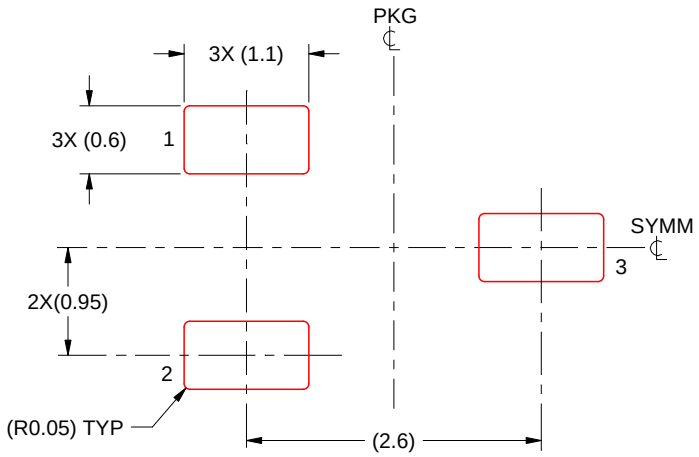


SOLDER MASK DETAILS

4220743/D 08/2024

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.



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

4220743/D 08/2024

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.

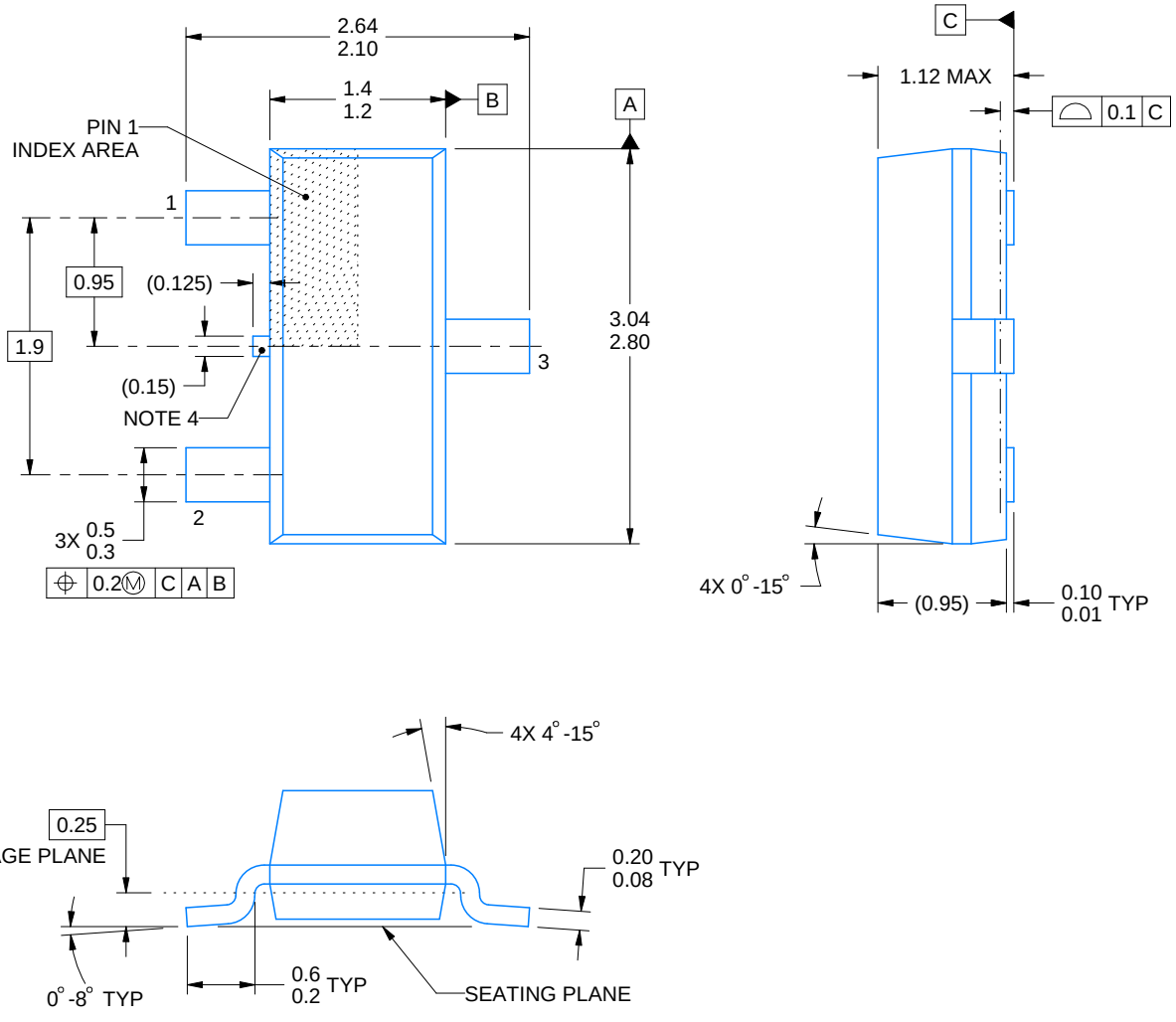
PACKAGE OUTLINE

DBZ0003A



SOT-23 - 1.12 mm max height

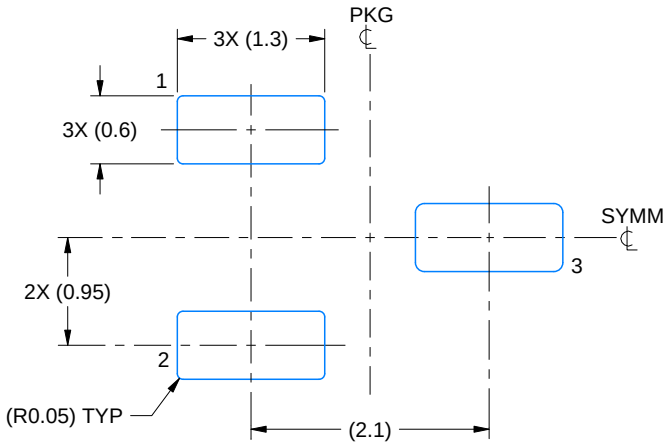
SMALL OUTLINE TRANSISTOR



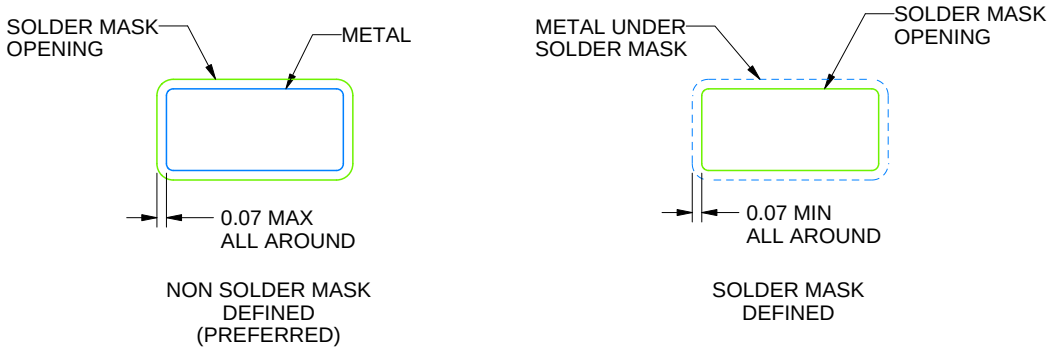
4214838/F 08/2024

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 registration TO-236, except minimum foot length.
4. Support pin may differ or may not be present.
5. Body dimensions do not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.25mm per side



LAND PATTERN EXAMPLE
SCALE:15X

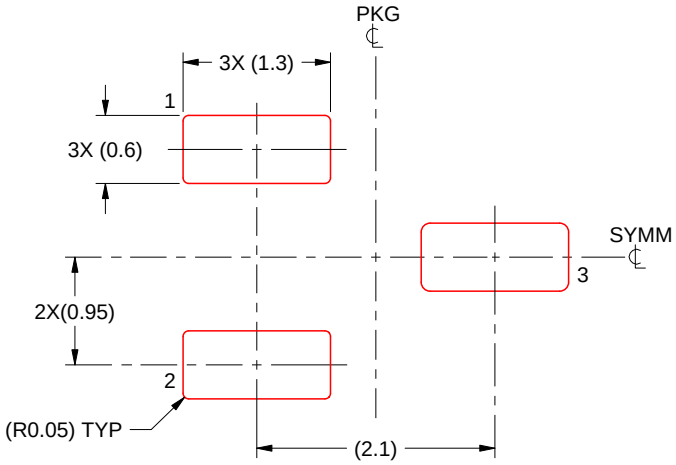


SOLDER MASK DETAILS

4214838/F 08/2024

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.



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

4214838/F 08/2024

NOTES: (continued)

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

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