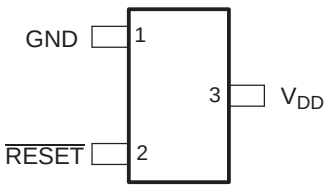
FEATURES

- **Controlled Baseline**
  - **One Assembly Site**
  - **One Test Site**
  - **One Fabrication Site**
- **Extended Temperature Performance of –55°C to 125°C**
- **Enhanced Diminishing Manufacturing Sources (DMS) Support**
- **Enhanced Product-Change Notification**
- **Qualification Pedigree** (1)
- **3-Pin SOT-23 Package**
- **Supply Current of 9 μA (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 MAX 809**

(1) Component qualification in accordance with JEDEC and industry standards to ensure reliable operation over an extended temperature range. This includes, but is not limited to, Highly Accelerated Stress Test (HAST) or biased 85/85, temperature cycle, autoclave or unbiased HAST, electromigration, bond intermetallic life, and mold compound life. Such qualification testing should not be viewed as justifying use of this component beyond specified performance and environmental limits.

DBV PACKAGE
(TOP VIEW)



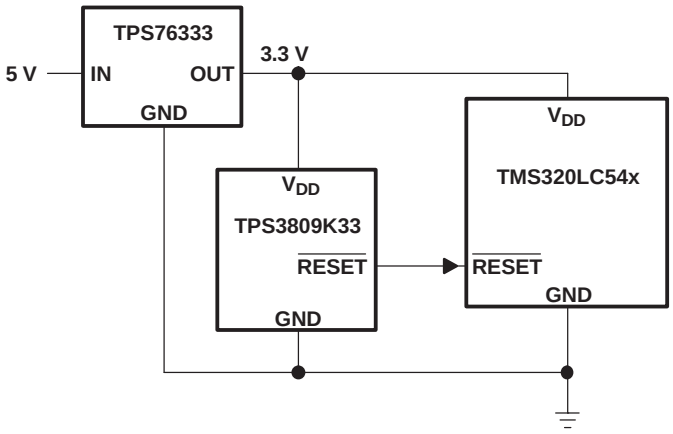
DESCRIPTION

The TPS3809 family of supervisory circuits provides circuit initialization and timing supervision, primarily for DSPs and processor-based systems.

During power-on, $\overline{RESET}$ is asserted when the supply voltage V_{DD} becomes higher than 1.1 V. Thereafter, the supervisory circuit monitors V_{DD} and keeps $\overline{RESET}$ active as long as V_{DD} remains below the threshold voltage V_{IT}. An internal timer delays the return of the output to the inactive state (high) to ensure proper system reset. The delay time, $t_{d(typ)}$ = 200 ms, starts after V_{DD} has risen above the V_{IT}. When the supply voltage drops below the V_{IT}, the output becomes active (low) again. No external components are required. All the devices of this family have a fixed-sense V_{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 TPS3809 devices are characterized for operation over a temperature range of –55°C to 125°C.

TYPICAL APPLICATIONS



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

AVAILABLE OPTIONS

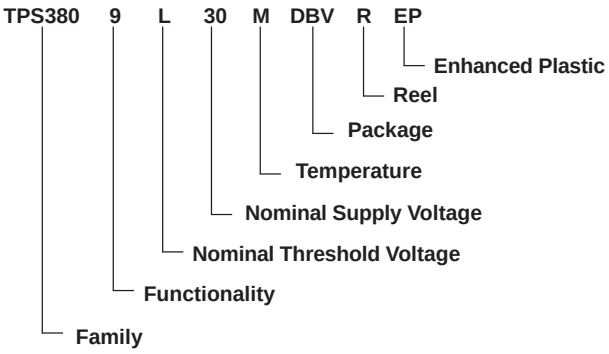
T_A	DEVICE NAME	THRESHOLD VOLTAGE	MARKING
–55°C to 125°C	TPS3809L30MDBVREP(1)	2.64 V	PLYM
	TPS3809K33MDBVREP(1)	2.93 V	PLZM
	TPS3809I50MDBVREP(1)	4.55 V	PMAM

(1) The DBVR passive indicates tape and reel of 3000 parts.

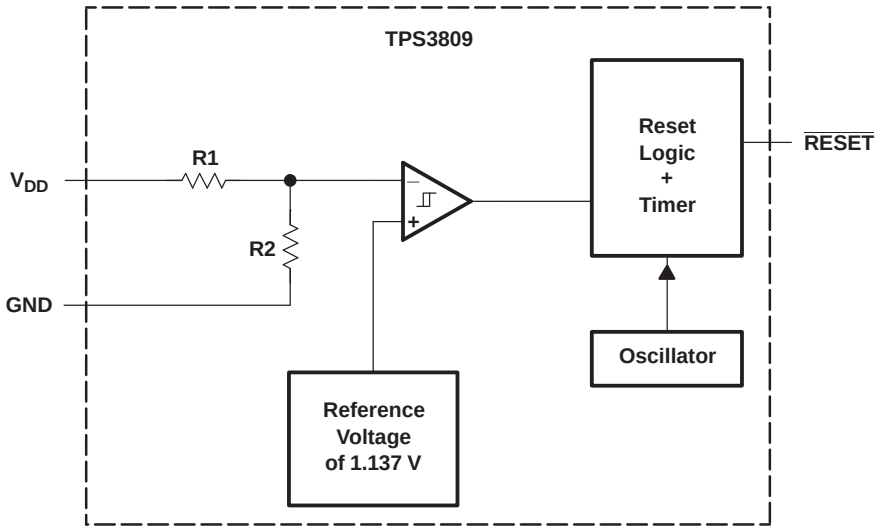
FUNCTION/TRUTH TABLE

$V_{DD} > V_{IT}$	$\overline{RESET}$
0	L
1	H

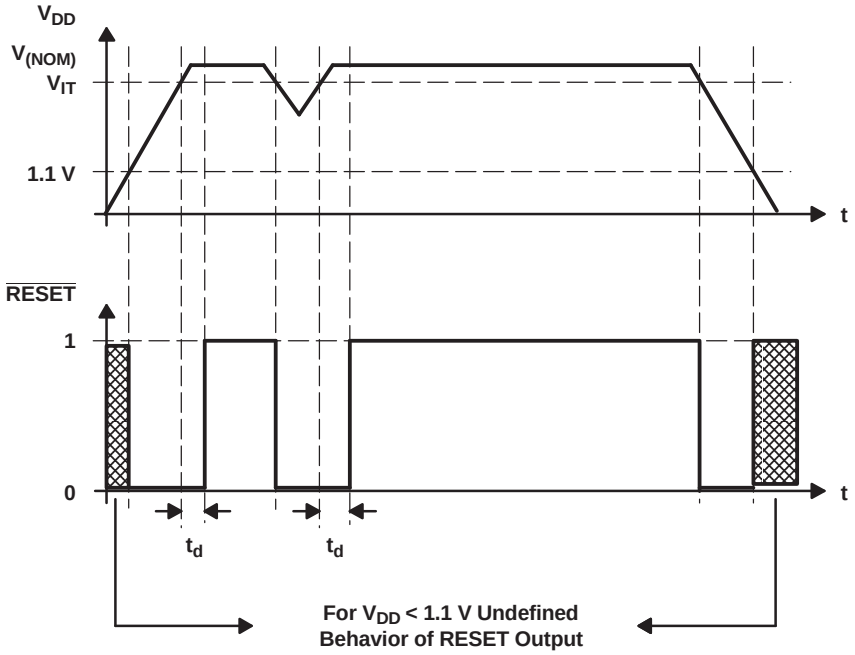
ORDERING INFORMATION



FUNCTIONAL BLOCK DIAGRAM



TIMING DIAGRAM



Absolute Maximum Ratings(1)

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

			MIN	MAX	UNIT
	Supply voltage(2)	V_{DD}		7	V
		All other pins	–0.3	7	
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
	Continuous total power dissipation			See Dissipation Rating Table	
T_A	Operating free-air temperature range		–55	125	°C
T_{stg}	Storage temperature range		–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 = 1000h continuously.

Dissipation Ratings

PACKAGE	$T_A < 25°C$ POWER RATING	DERATING FACTOR ABOVE $T_A = 25°C$	$T_A = 70°C$ POWER RATING	$T_A = 85°C$ POWER RATING
DBV	437 mW	3.5 mW/°C	280 mW	227 mW

Recommended Operating Conditions

		MIN	MAX	UNIT
V_{DD}	Supply voltage	2	6	V
T_A	Operating free-air temperature	–55	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} = 2.5 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_{DD} = 6 V,	I_{OH} = –4 mA,	T_A = 125°C	V_{DD} – 0.5			
V_{OL}	Low-level output voltage		V_{DD} = 2 V to 6 V,	I_{OL} = 500 µA				0.2	V
			V_{DD} = 3.3 V,	I_{OL} = 2 mA				0.4	
			V_{DD} = 6 V,	I_{OL} = 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)	TPS3809L30				2.58	2.64	2.7	V
		TPS3809K33				2.87	2.93	2.99	
		TPS3809I50				4.45	4.55	4.65	
V_{hys}	Hysteresis	TPS3809L30					35		mV
		TPS3809K33					40		
		TPS3809I50					60		
I_{DD}	Supply current		V_{DD} = 2 V,	Output unconnected			9	12	µA
			V_{DD} = 6 V,	Output 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, V_{DD} ≥ 15 µs/V.
(2) To ensure best stability of the threshold voltage, a bypass capacitor (0.1-µF ceramic) should be placed near the supply terminals.

Timing Requirements

R_L = 1 MΩ, C_L = 50 pF, T_A = 25°C

PARAMETER		TEST CONDITIONS	MIN	MAX	UNIT
t_w	Pulse width at V_{DD}	V_{DD} = $V_{IT–}$ + 0.2 V, V_{DD} = $V_{IT–}$ – 0.2 V	3		µs

Switching Characteristics

R_L = 1 MΩ, C_L = 50 pF, T_A = 25°C

PARAMETER			TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_d	Delay time		V_{DD} ≥ $V_{IT–}$ + 0.2 V, See timing diagram	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		1		ms

TYPICAL CHARACTERISTICS

LOW-LEVEL OUTPUT VOLTAGE
vs
LOW-LEVEL OUTPUT CURRENT

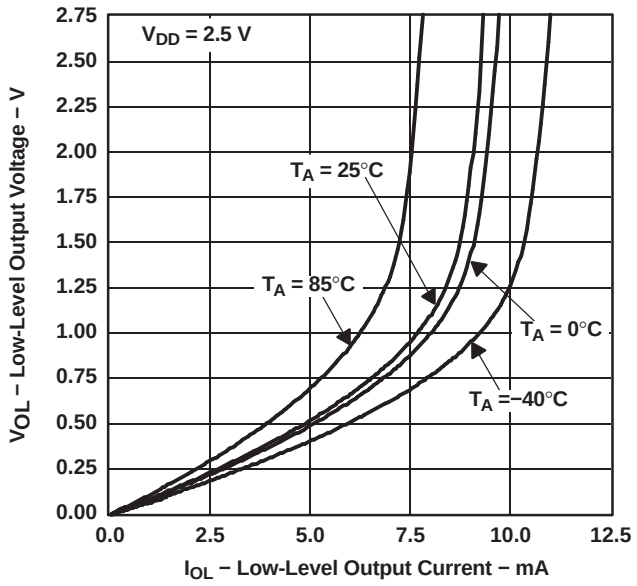


Figure 1.

HIGH-LEVEL OUTPUT VOLTAGE
vs
HIGH-LEVEL OUTPUT CURRENT

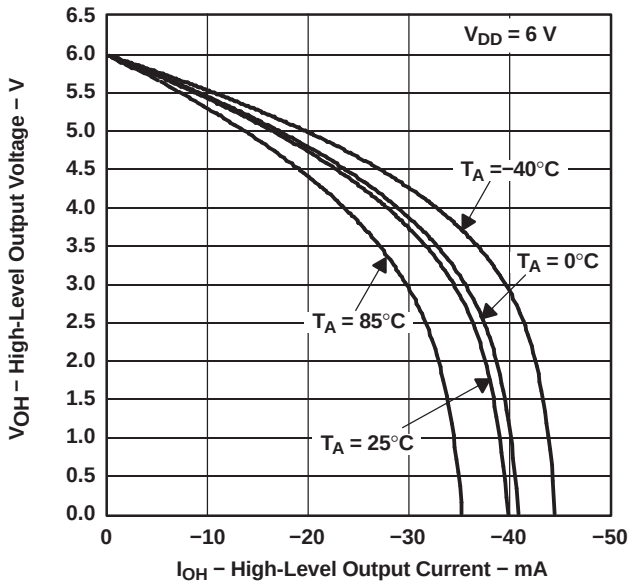


Figure 2.

HIGH-LEVEL OUTPUT VOLTAGE
vs
HIGH-LEVEL OUTPUT CURRENT

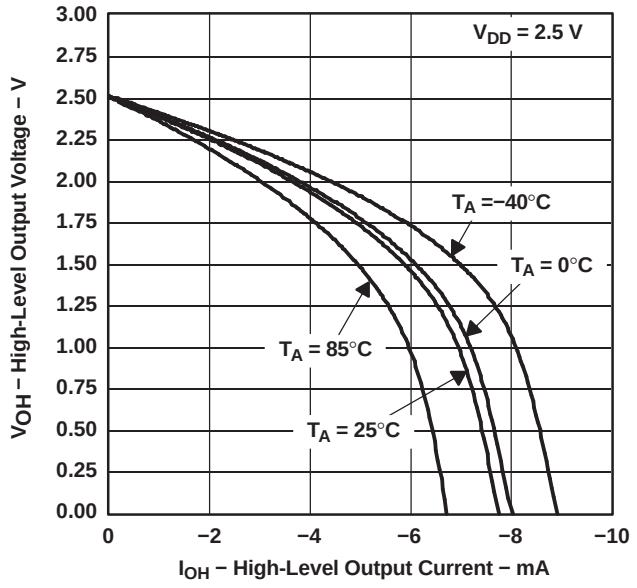


Figure 3.

NORMALIZED INPUT THRESHOLD VOLTAGE
vs
FREE-AIR TEMPERATURE AT V_{DD}

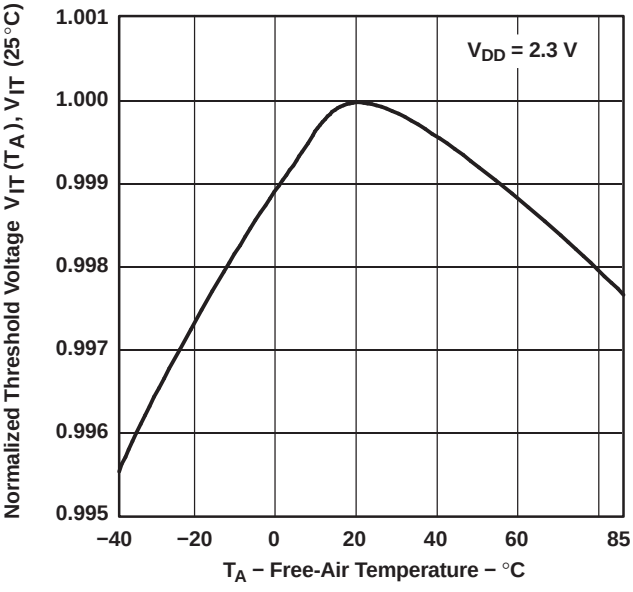


Figure 4.

TYPICAL CHARACTERISTICS (continued)

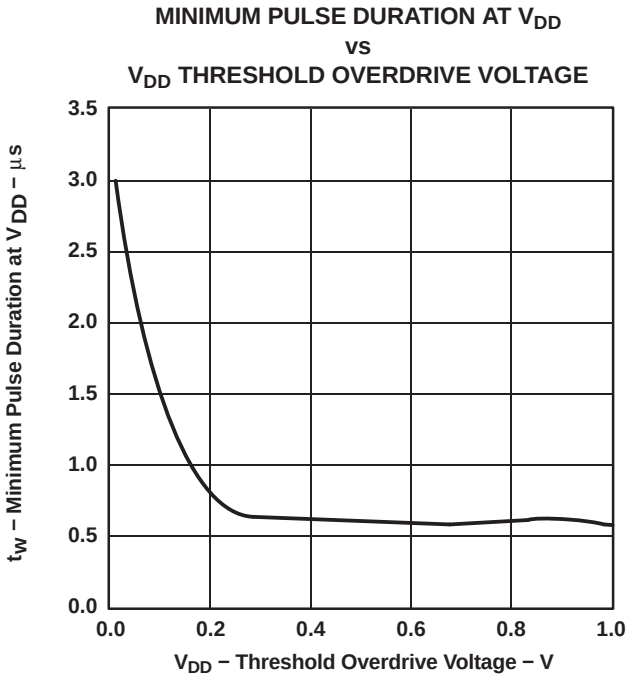


Figure 5.

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)
TPS3809I50MDBVREP	Active	Production	SOT-23 (DBV) | 3	3000 | LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-55 to 125	PMAM
TPS3809I50MDBVREP.A	Active	Production	SOT-23 (DBV) | 3	3000 | LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-55 to 125	PMAM
TPS3809K33MDBVREP	Active	Production	SOT-23 (DBV) | 3	3000 | LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-55 to 125	PLZM
TPS3809K33MDBVREP.A	Active	Production	SOT-23 (DBV) | 3	3000 | LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-55 to 125	PLZM
TPS3809L30MDBVREP	Active	Production	SOT-23 (DBV) | 3	3000 | LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-55 to 125	PLYM
TPS3809L30MDBVREP.A	Active	Production	SOT-23 (DBV) | 3	3000 | LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-55 to 125	PLYM
V62/06636-01XE	Active	Production	SOT-23 (DBV) | 3	3000 | LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-55 to 125	PLYM
V62/06636-02XE	Active	Production	SOT-23 (DBV) | 3	3000 | LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-55 to 125	PLZM
V62/06636-03XE	Active	Production	SOT-23 (DBV) | 3	3000 | LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-55 to 125	PMAM

(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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OTHER QUALIFIED VERSIONS OF TPS3809-EP :

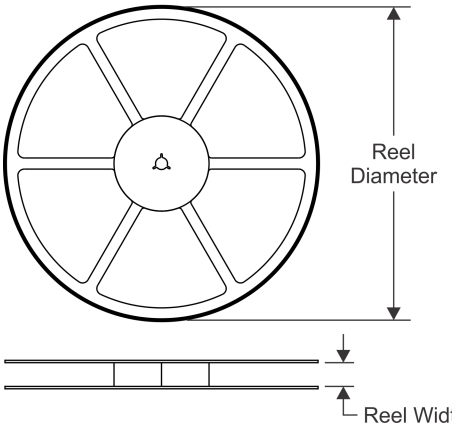
- Catalog : TPS3809
- Automotive : TPS3809-Q1

NOTE: Qualified Version Definitions:

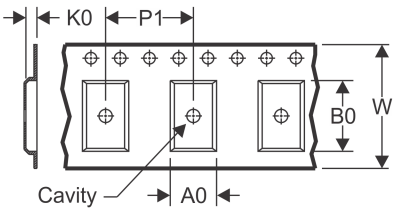
- Catalog - TI's standard catalog product
- Automotive - Q100 devices qualified for high-reliability automotive applications targeting zero defects

TAPE AND REEL INFORMATION

REEL DIMENSIONS

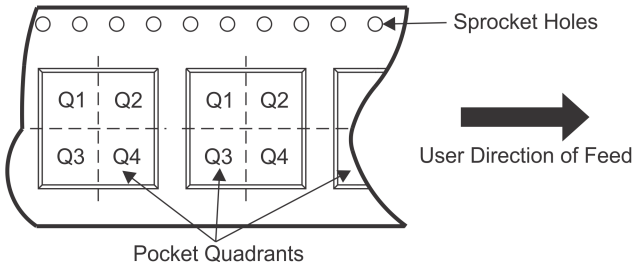


TAPE DIMENSIONS



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

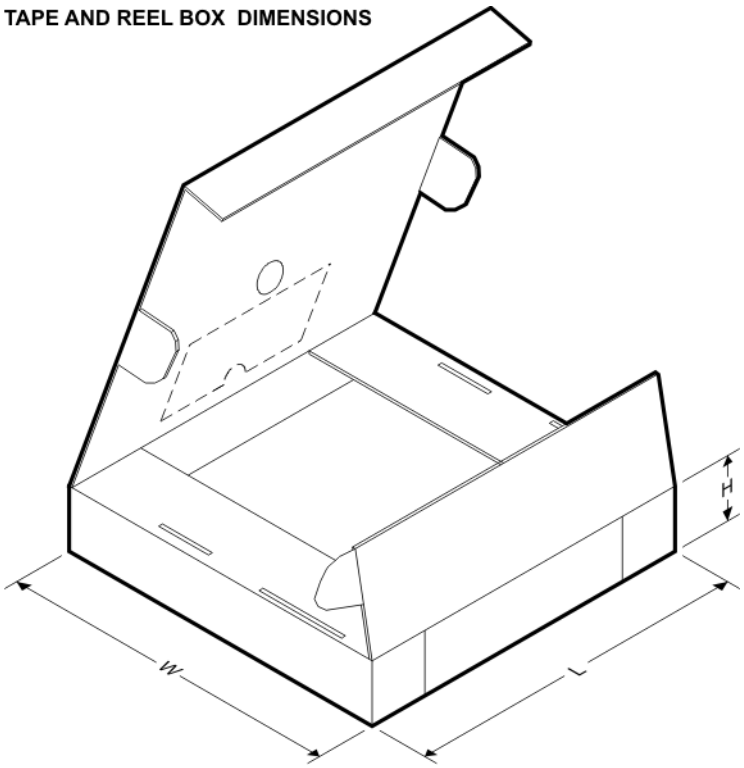
QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
TPS3809I50MDBVREP	SOT-23	DBV	3	3000	180.0	9.0	3.3	3.2	1.47	4.0	8.0	Q3
TPS3809K33MDBVREP	SOT-23	DBV	3	3000	180.0	9.0	3.3	3.2	1.47	4.0	8.0	Q3
TPS3809L30MDBVREP	SOT-23	DBV	3	3000	180.0	9.0	3.3	3.2	1.47	4.0	8.0	Q3

TAPE AND REEL BOX DIMENSIONS



*All dimensions are nominal

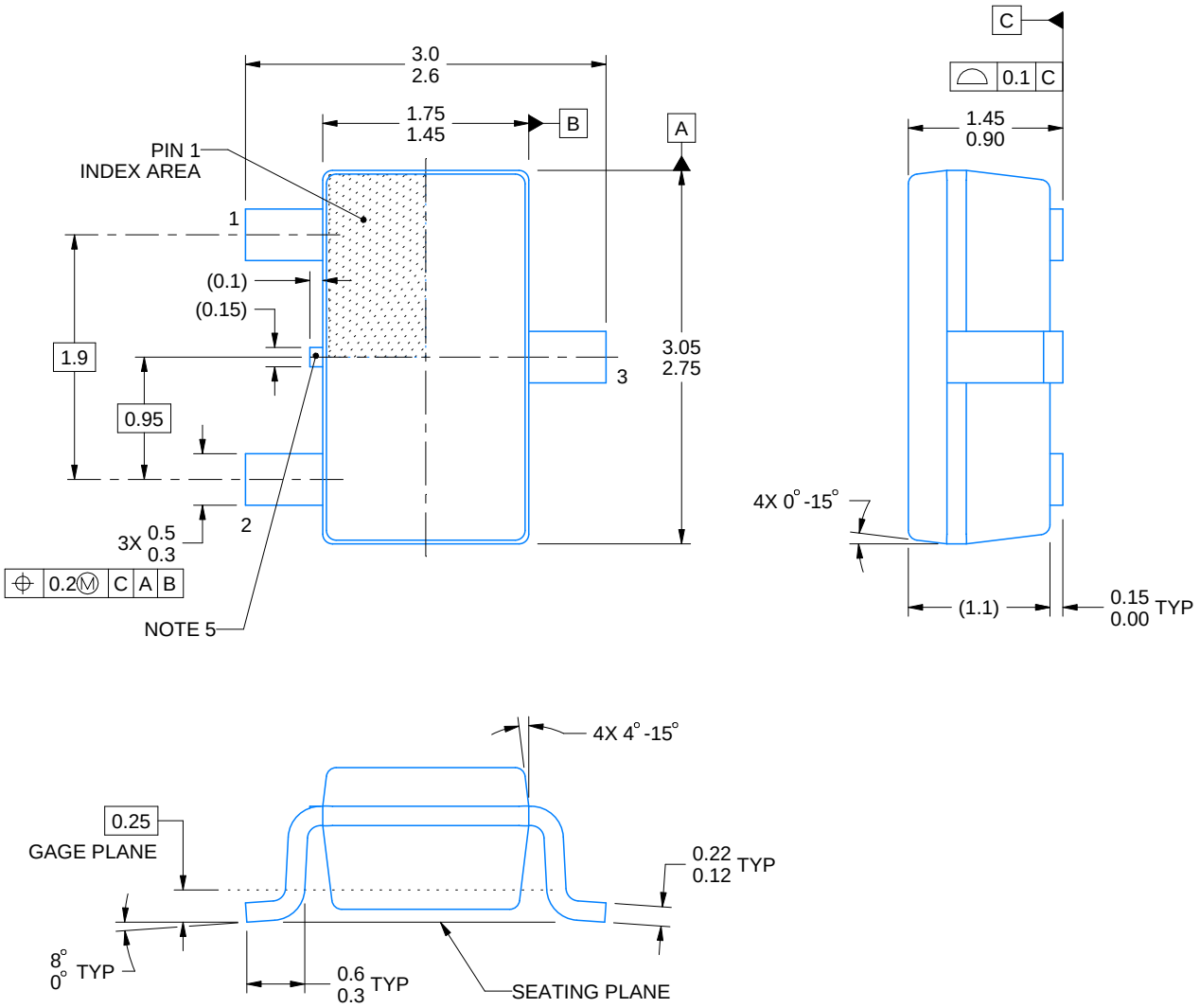
Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
TPS3809I50MDBVREP	SOT-23	DBV	3	3000	182.0	182.0	20.0
TPS3809K33MDBVREP	SOT-23	DBV	3	3000	182.0	182.0	20.0
TPS3809L30MDBVREP	SOT-23	DBV	3	3000	182.0	182.0	20.0

PACKAGE OUTLINE

DBV0003A

SOT-23 - 1.45 mm max height

SMALL OUTLINE TRANSISTOR



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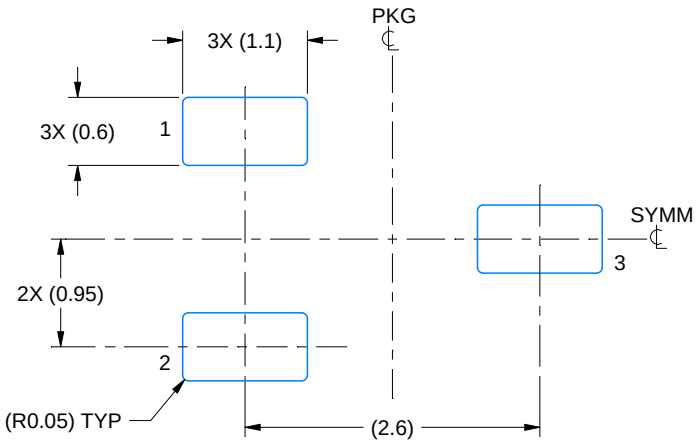
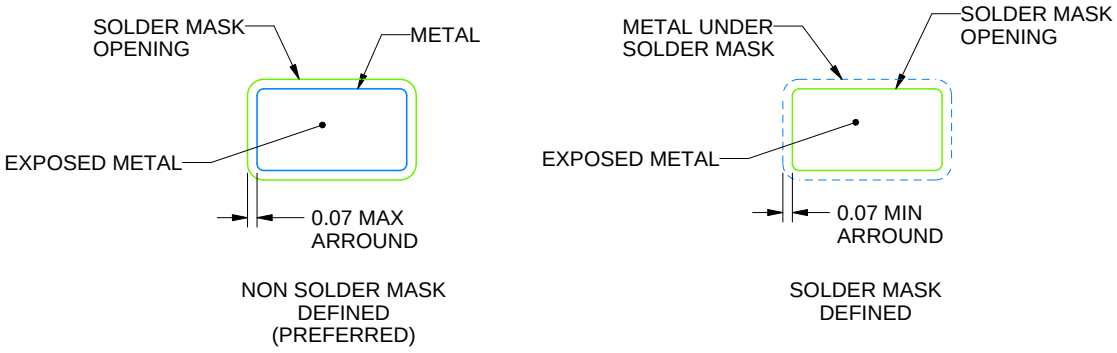
NOTES:

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

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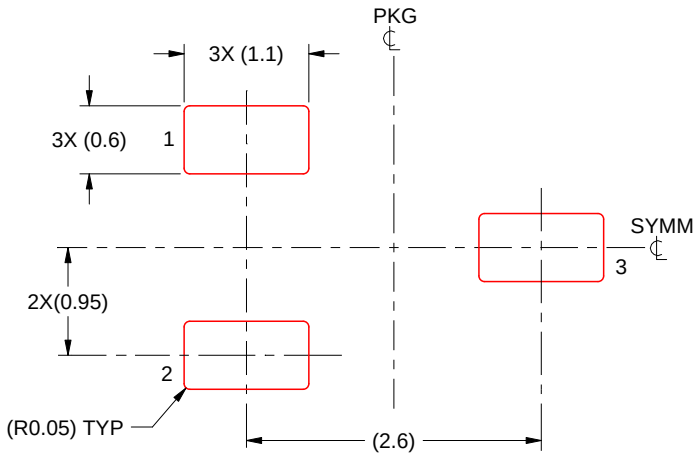
NOTES: (continued)

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



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.

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