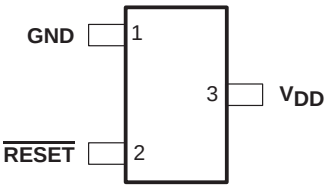
- **3-Pin SOT-23 Package**
- **Supply Current of 9 μA (Typical)**
- **Precision Supply Voltage Monitor 2.5 V, 3 V, 3.3 V, 5 V**
- **Power-On Reset Generator With Fixed Delay Time of 200 ms**
- **Pin-For-Pin Compatible With MAX 809**
- **Temperature Range . . . –40°C to 85°C**

TPS3809 . . . DBV PACKAGE
(TOP VIEW)



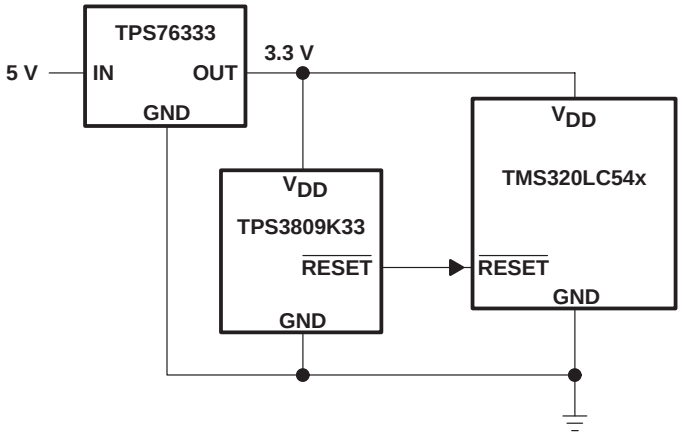
description

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

During power-on, $\overline{\text{RESET}}$ is asserted when the supply voltage V_{DD} becomes higher than 1.1 V. Thereafter, the supervisory circuit monitors V_{DD} and keeps $\overline{\text{RESET}}$ 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 threshold voltage V_{IT}. When the supply voltage drops below the threshold voltage V_{IT}, the output becomes active (low) again. No external components are required. All the devices of this family have a fixed sense-threshold voltage 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. The TPS3809 devices are characterized for operation over a temperature range of –40°C to 85°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**

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.

PRODUCTION DATA information is current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

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AVAILABLE OPTIONS

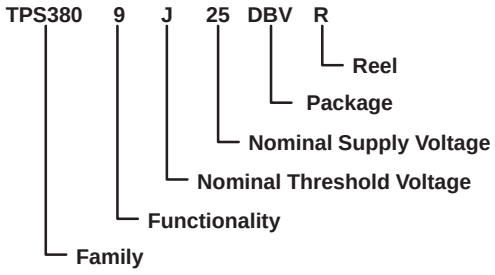
T_A	DEVICE NAME		THRESHOLD VOLTAGE	MARKING
–40°C to 85°C	TPS3809J25DBVR†	TPS3809J25DBVT‡	2.25 V	PCZI
	TPS3809L30DBVR†	TPS3809L30DBVT‡	2.64 V	PDAI
	TPS3809K33DBVR†	TPS3809K33DBVT‡	2.93 V	PDBI
	TPS3809I50DBVR†	TPS3809I50DBVT‡	4.55 V	PDCI

† The DBVR passive indicates tape and reel of 3000 parts.
‡ The DBVT passive indicates tape and reel of 250 parts.

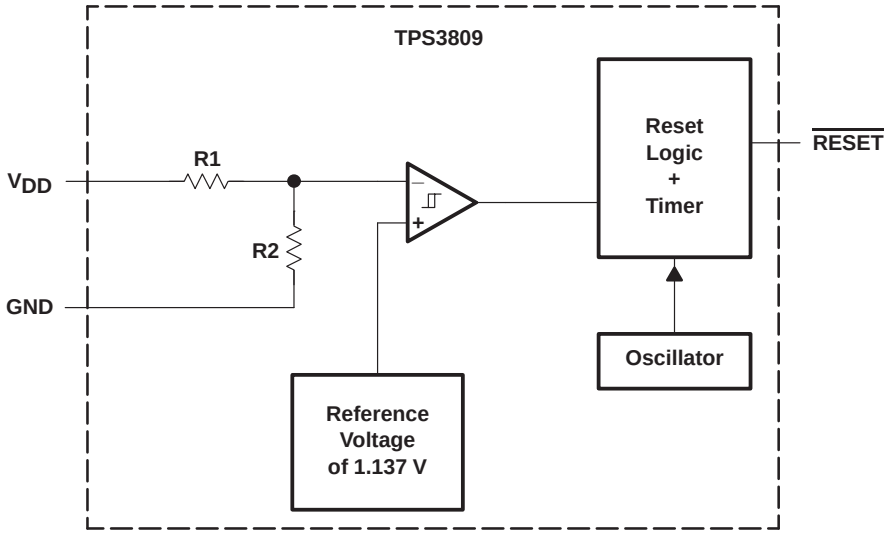
FUNCTION/TRUTH TABLE, TPS3809

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

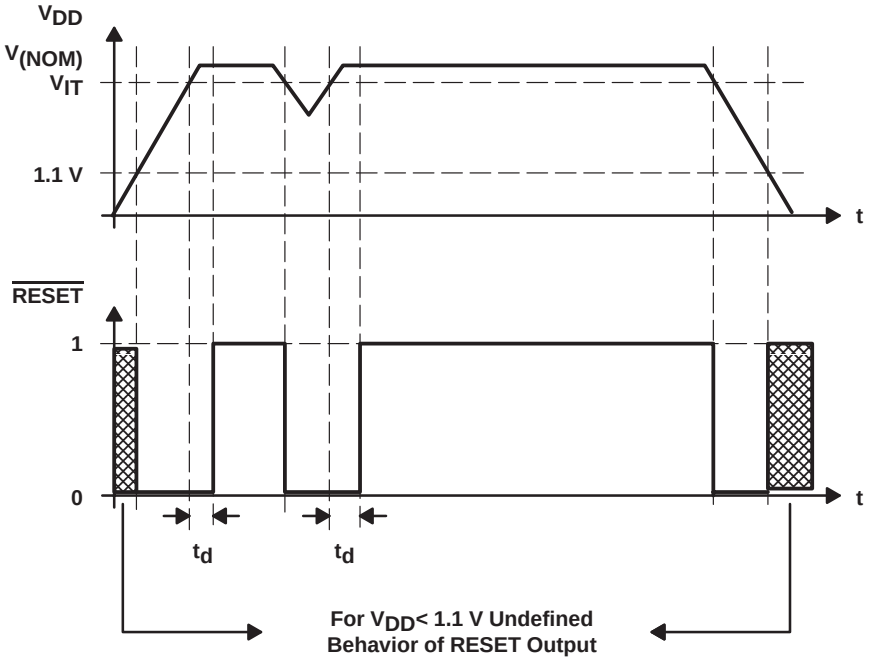
ORDERING INFORMATION



functional block diagram



timing diagram



absolute maximum ratings over operating free-air temperature (unless otherwise noted)†

Supply voltage, V_{DD} (see Note1) . . . . . 7 V
All other pins (see Note 1) . . . . . –0.3 V to 7 V
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
Continuous total power dissipation . . . . . See Dissipation Rating Table
Operating free-air temperature range, T_A . . . . . –40°C to 85°C
Storage temperature range, T_{stg} . . . . . –65°C to 150°C
Soldering temperature . . . . . 260°C

† 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.

NOTE 1: 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 RATING TABLE

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 at specified temperature range

	MIN	MAX	UNIT
Supply voltage, V_{DD}	2	6	V
Operating free-air temperature range, T_A	–40	85	°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_{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 (see Note 2)		V_{DD} ≥ 1.1 V, I_{OL} = 50 µA			0.2	V
$V_{IT–}$	Negative-going input threshold voltage (see Note 3)	TPS3809J25	T_A – 40°C to 85°C	2.20	2.25	2.30	V
		TPS3809L30		2.58	2.64	2.70	
		TPS3809K33		2.87	2.93	2.99	
		TPS3809I50		4.45	4.55	4.65	
V_{hys}	Hysteresis	TPS3809J25			30		mV
		TPS3809L30			35		
		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

NOTES: 2. The lowest supply voltage at which $\overline{\text{RESET}}$ becomes active. $t_{r,\ VDD}$ ≥ 15 µs/V.
3. To ensure best stability of the threshold voltage, a bypass capacitor (0.1 µF ceramic) should be placed near the supply terminals.

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

PARAMETER			TEST CONDITIONS	MIN	TYP	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 at 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		µs

TYPICAL CHARACTERISTICS

LOW-LEVEL OUTPUT VOLTAGE vs LOW-LEVEL OUTPUT CURRENT

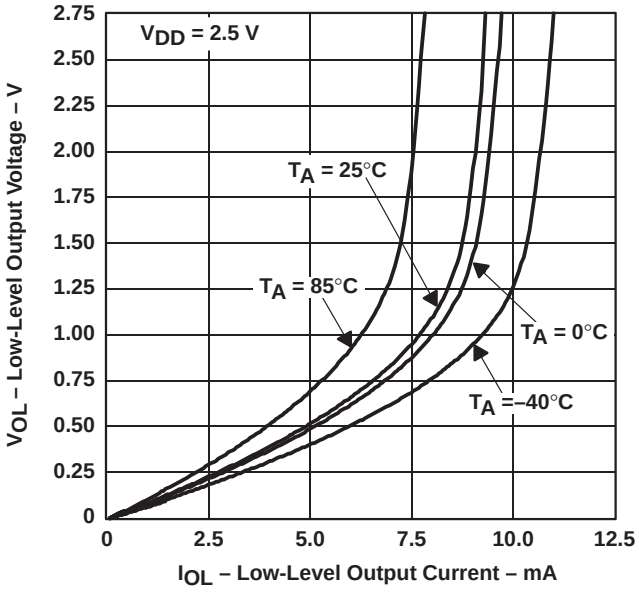


Figure 1

SUPPLY CURRENT vs SUPPLY VOLTAGE

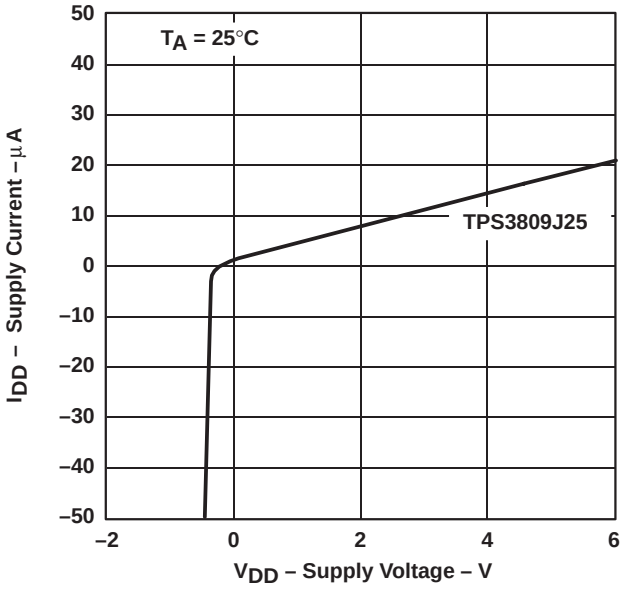


Figure 2

HIGH-LEVEL OUTPUT VOLTAGE vs HIGH-LEVEL OUTPUT CURRENT

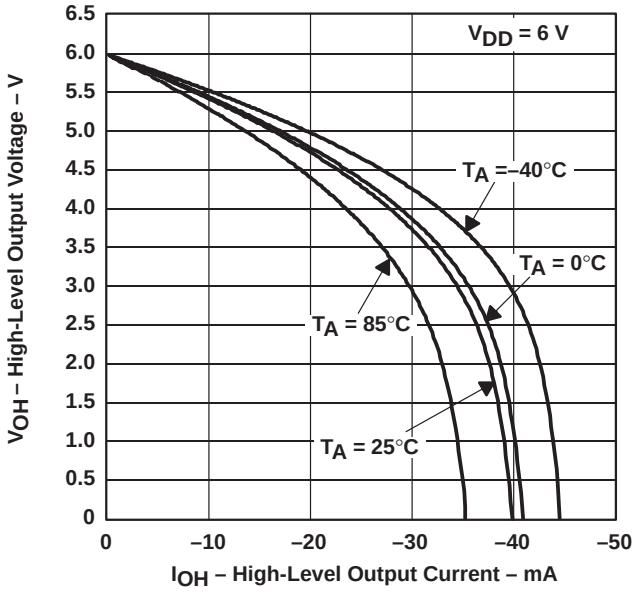


Figure 3

HIGH-LEVEL OUTPUT VOLTAGE vs HIGH-LEVEL OUTPUT CURRENT

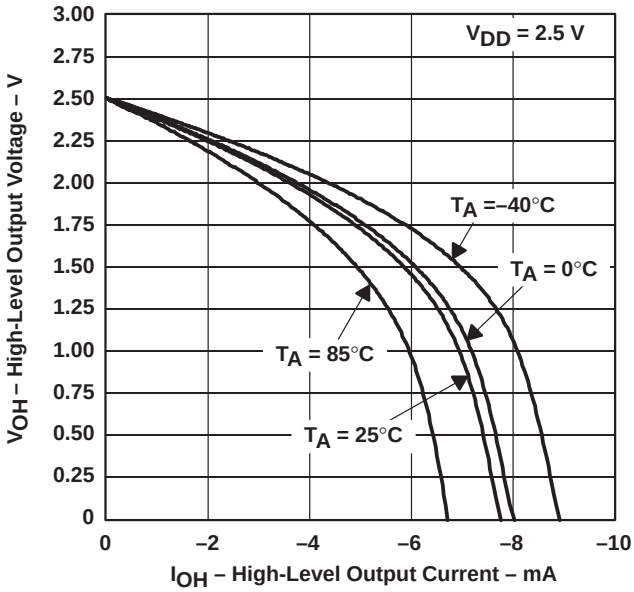


Figure 4

TYPICAL CHARACTERISTICS

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

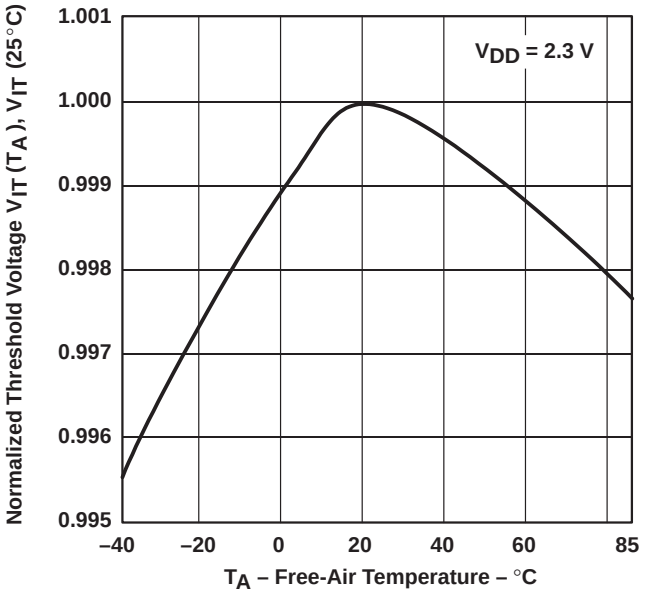


Figure 5

MINIMUM PULSE DURATION AT V_{DD} vs V_{DD} THRESHOLD OVERDRIVE VOLTAGE

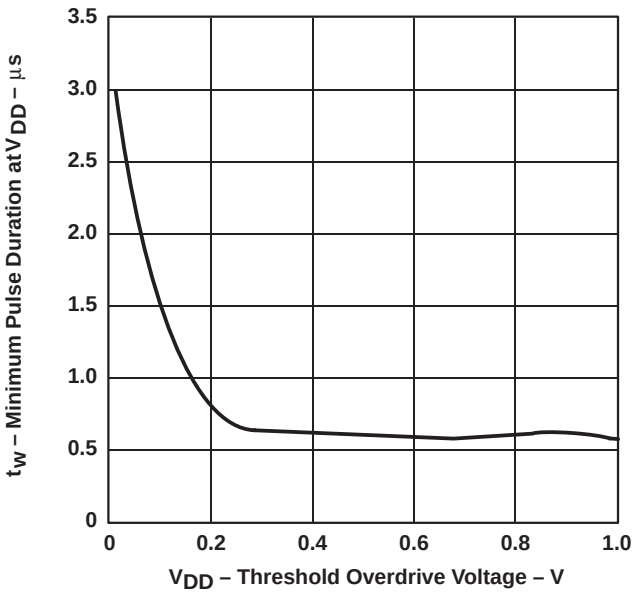
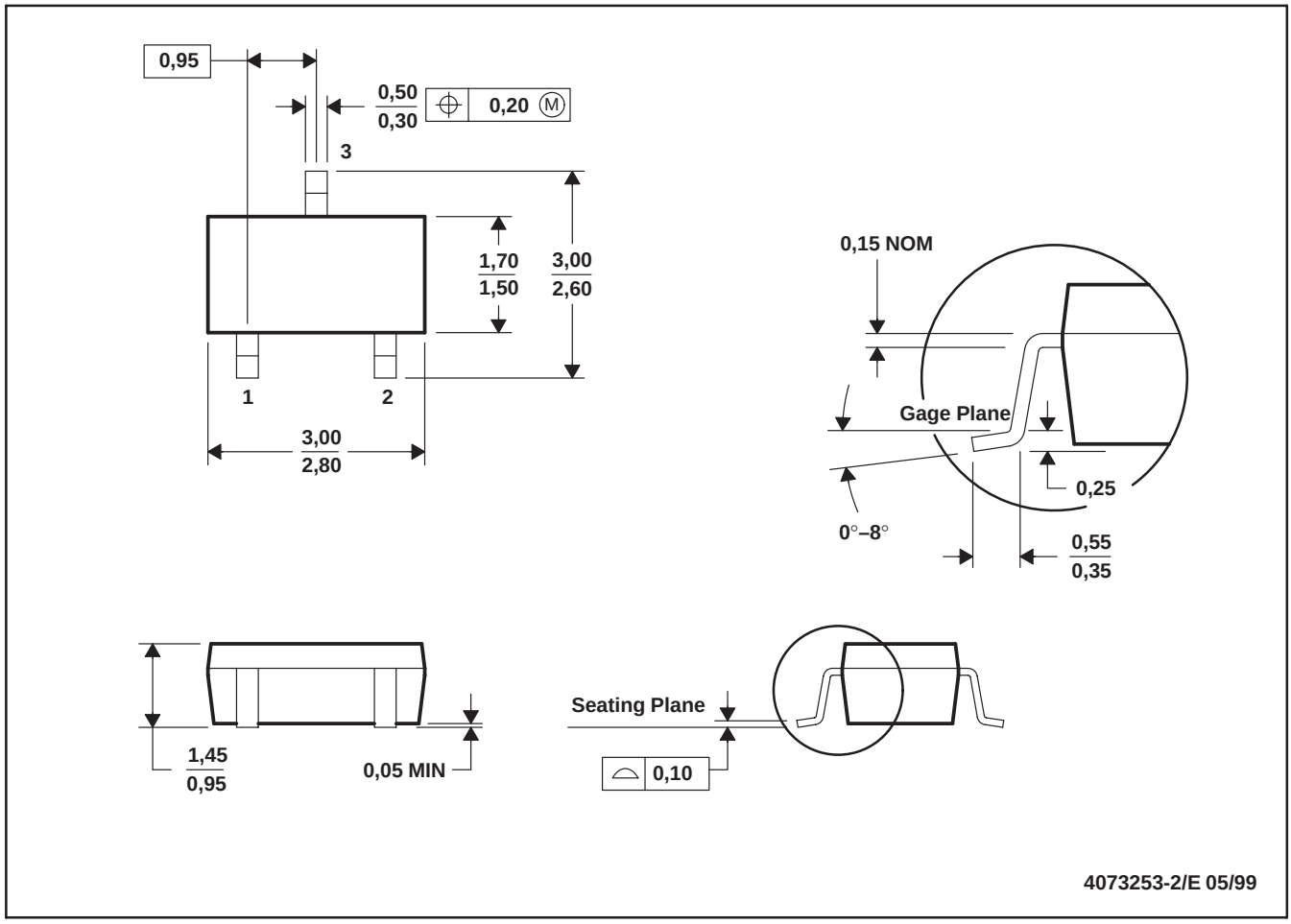


Figure 6

MECHANICAL DATA

DBV (R-PDSO-G3) **PLASTIC SMALL-OUTLINE**



NOTES: A. All linear dimensions are in millimeters.
B. This drawing is subject to change without notice.
C. Body dimensions do not include mold flash or protrusion.

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