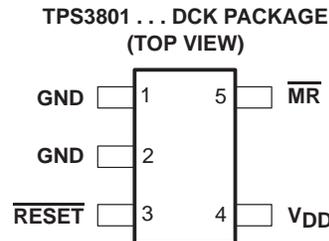


- 5-Pin SC-70 (SOT-323) Package
- Supply Current of 9 μA (Typ)
- Power-On Reset Generator With Fixed Delay Time of 200 ms
- Precision Supply Voltage Monitor 2.5 V, 3 V, 3.3 V, 5 V
- Manual Reset Input
- Temperature Range . . . -40°C to 85°C



description

The TPS3801 family of supervisory circuits provide circuit initialization and timing supervision, primarily for DSPs and processor-based systems.

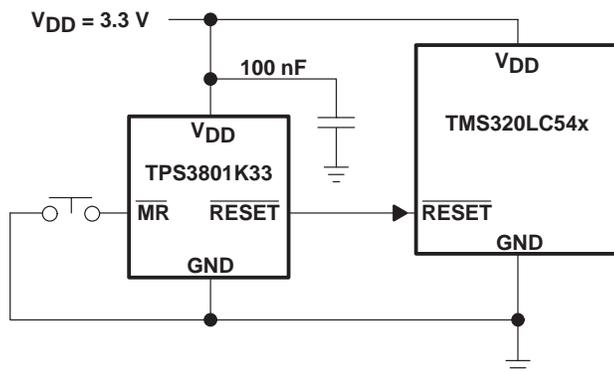
During power-on, $\overline{\text{RESET}}$ is asserted when the supply voltage V_{DD} becomes higher than 1.1 V. Thereafter, the supervisory circuit monitors V_{DD} and keeps $\overline{\text{RESET}}$ active as long as V_{DD} remains below the threshold voltage V_{IT} . An internal timer delays the return of the output to the inactive state (high) to ensure proper system reset. The delay time, $t_{\text{d(typ)}} = 200 \text{ ms}$, 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 TPS3801 devices incorporate a manual reset input, $\overline{\text{MR}}$. A low level at $\overline{\text{MR}}$ causes $\overline{\text{RESET}}$ to become active.

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 5-pin SC-70 (SOT-323) package which is only about half the size of a 5-pin SOT-23 package.

The TPS3801 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.

TPS3801J25, TPS3801L30, TPS3801K33, TPS3801I50 ULTRA-SMALL SUPPLY VOLTAGE SUPERVISORS

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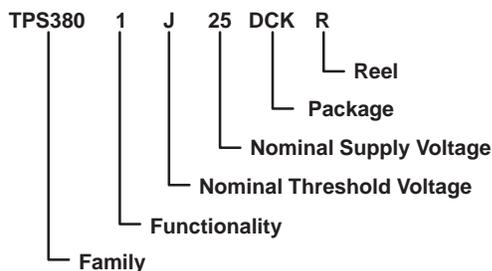
AVAILABLE OPTIONS

T _A	DEVICE NAME	THRESHOLD VOLTAGE	MARKING
-40°C to 85°C	TPS3801J25DCK	2.25 V	NJA
	TPS3801L30DCK	2.64 V	NPA
	TPS3801K33DCK	2.93 V	NWA
	TPS3801I50DCK	4.55 V	NSA

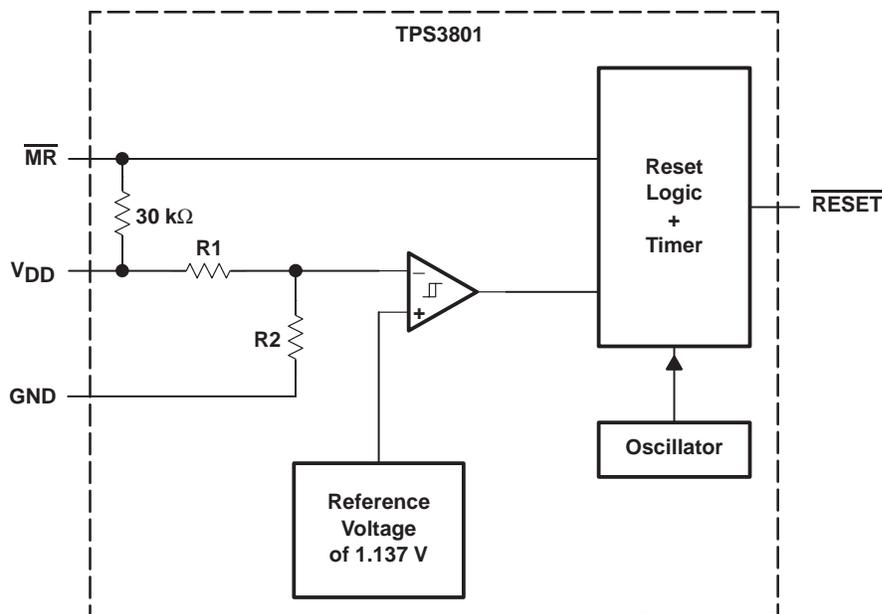
FUNCTION/TRUTH TABLE, TPS3801

$\overline{\text{MR}}$	V _{DD} >V _{IT}	$\overline{\text{RESET}}$
L	0	L
L	1	L
H	0	L
H	1	H

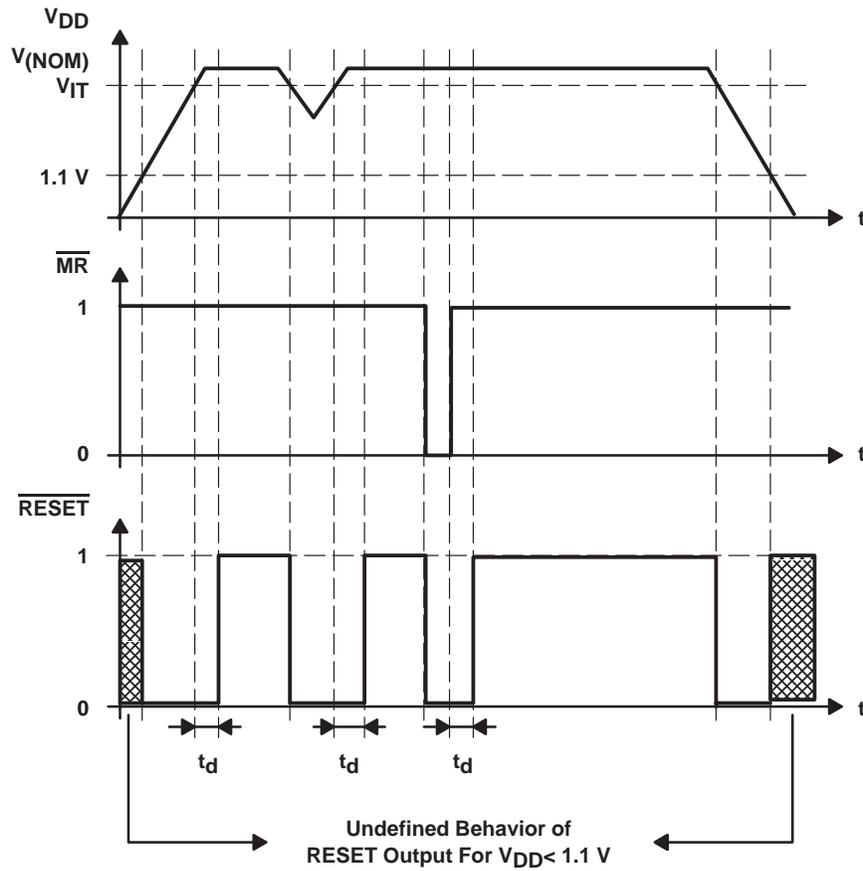
ORDERING INFORMATION



functional block diagram



timing diagram



TPS3801J25, TPS3801L30, TPS3801K33, TPS3801I50 ULTRA-SMALL SUPPLY VOLTAGE SUPERVISORS

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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	$T_A < 25^\circ\text{C}$ POWER RATING	DERATING FACTOR ABOVE $T_A = 25^\circ\text{C}$	$T_A = 70^\circ\text{C}$ POWER RATING	$T_A = 85^\circ\text{C}$ POWER RATING
DCK	321 mW	2.6 mW/°C	206 mW	167 mW

recommended operating conditions at specified temperature range

	MIN	MAX	UNIT
Supply voltage, V_{DD}	2	6	V
Input voltage, V_I	0	$V_{DD}+0.3$	V
High-level input voltage, V_{IH}	$0.7 \times V_{DD}$		V
Low-level input voltage, V_{IL}		$0.3 \times V_{DD}$	V
Input transition rise and fall rate at \overline{MR} , $\Delta t/\Delta V$		100	ns/V
Operating free-air temperature range, T_A	-40	85	°C



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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)	T _A = 40°C to +85°C	TPS3801J25	2.20	2.25	2.30	V	
			TPS3801L30	2.58	2.64	2.70		
			TPS3801K33	2.87	2.93	2.99		
			TPS3801I50	4.45	4.55	4.65		
V _{hys}	Hysteresis	TPS3801J25	30			mV		
		TPS3801L30	35					
		TPS3801K33	40					
		TPS3801I50	60					
I _{IH}	High-level input current	MR	MR = 0.7 × V _{DD} , V _{DD} = 6 V		-40	-60	-100	μA
I _{IL}	Low-level input current		MR = 0 V, V _{DD} = 6 V		-130	-200	-340	
I _{DD}	Supply current	V _{DD} = 2 V, MR and output unconnected		9	12	μA		
		V _{DD} = 6 V, MR and 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 RESET becomes active. t_r, V_{DD} ≥ 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
		at MR	V _{DD} ≥ V _{IT-} + 0.2 V, V _{IL} = 0.3 × V _{DD} , V _{IH} = 0.7 × V _{DD}		100	ns

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, MR ≥ 0.7 × V _{DD} See timing diagram	120	200	280	ms
t _{PHL}	Propagation (delay) time, high-to-low-level output	MR to <u>RESET</u> delay	V _{DD} ≥ V _{IT-} + 0.2 V, V _{IL} = 0.3 × V _{DD} , V _{IH} = 0.7 × V _{DD}		15	ns
		V _{DD} to <u>RESET</u> 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

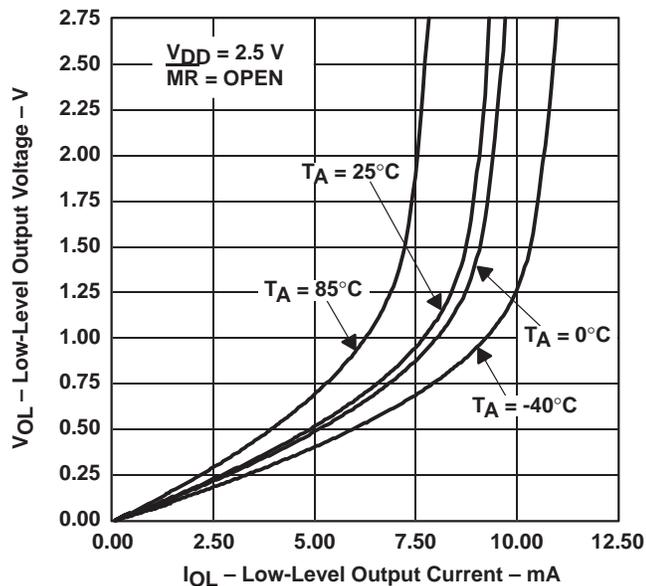


Figure 1

SUPPLY CURRENT
 vs
 SUPPLY VOLTAGE

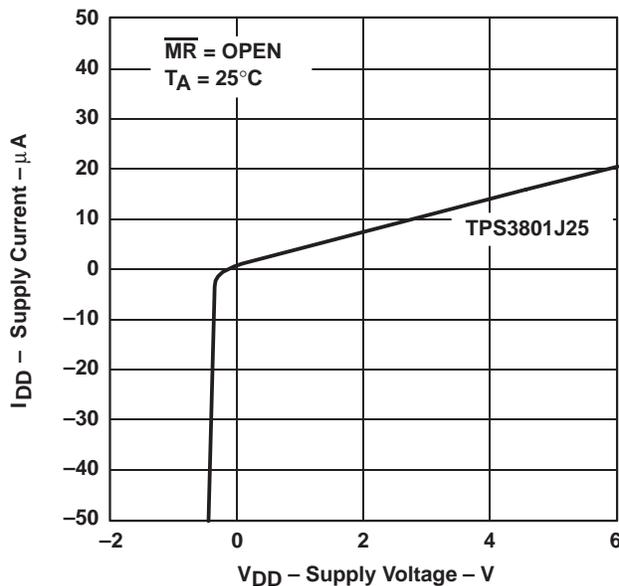


Figure 2

HIGH-LEVEL OUTPUT VOLTAGE
 vs
 HIGH-LEVEL OUTPUT CURRENT

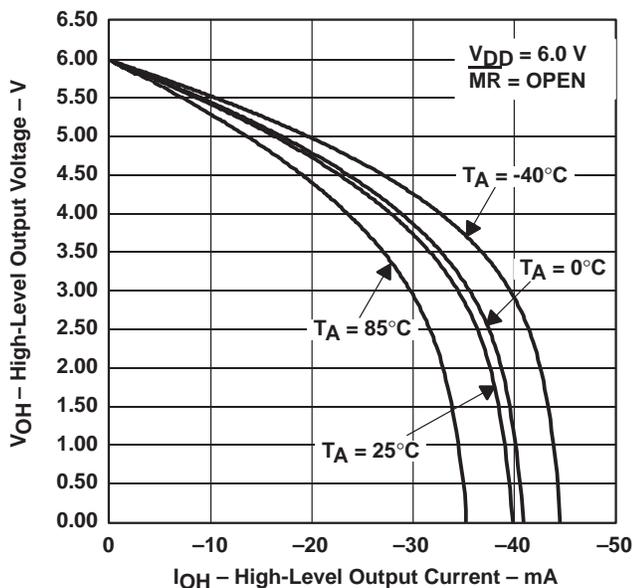


Figure 3

HIGH-LEVEL OUTPUT VOLTAGE
 vs
 HIGH-LEVEL OUTPUT CURRENT

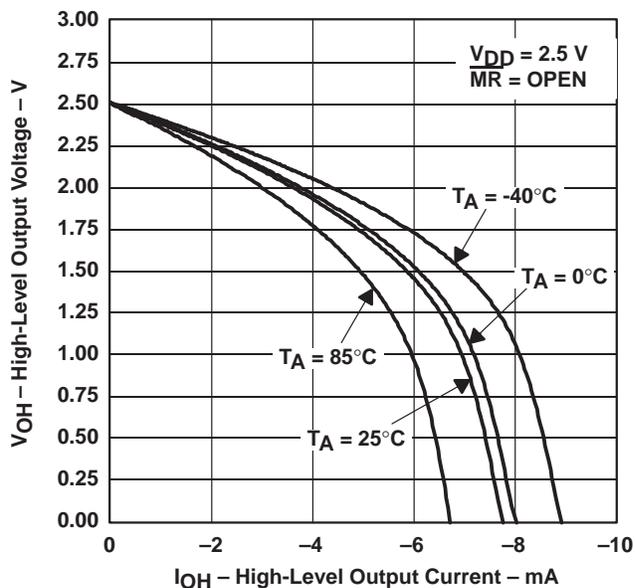
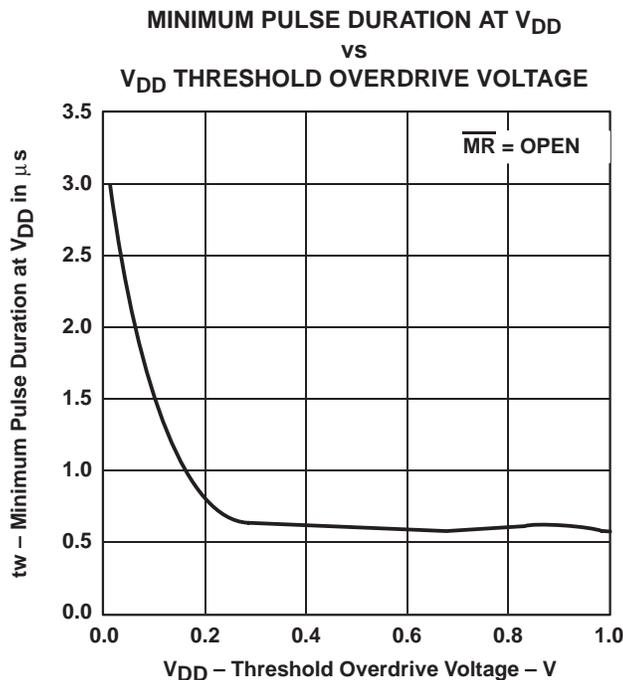
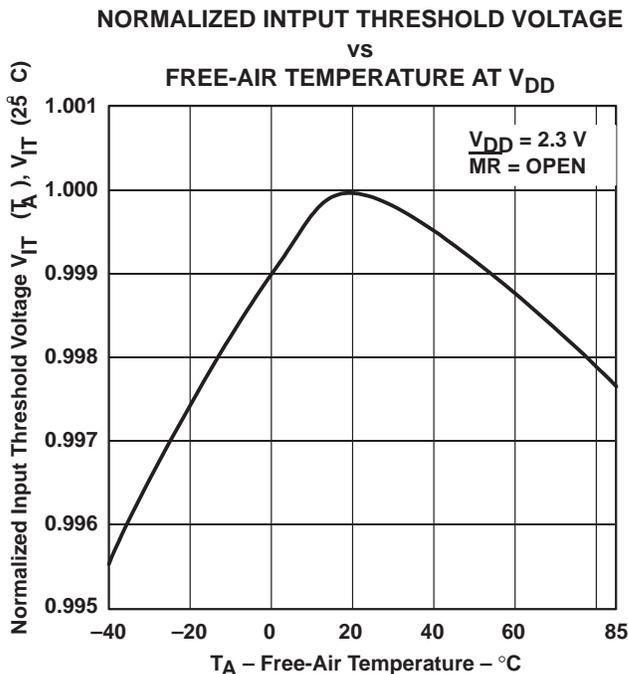
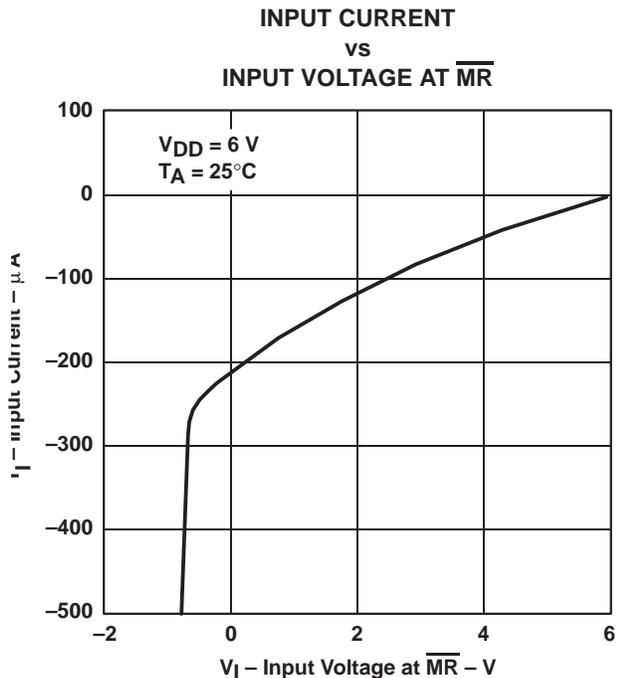


Figure 4

TYPICAL CHARACTERISTICS



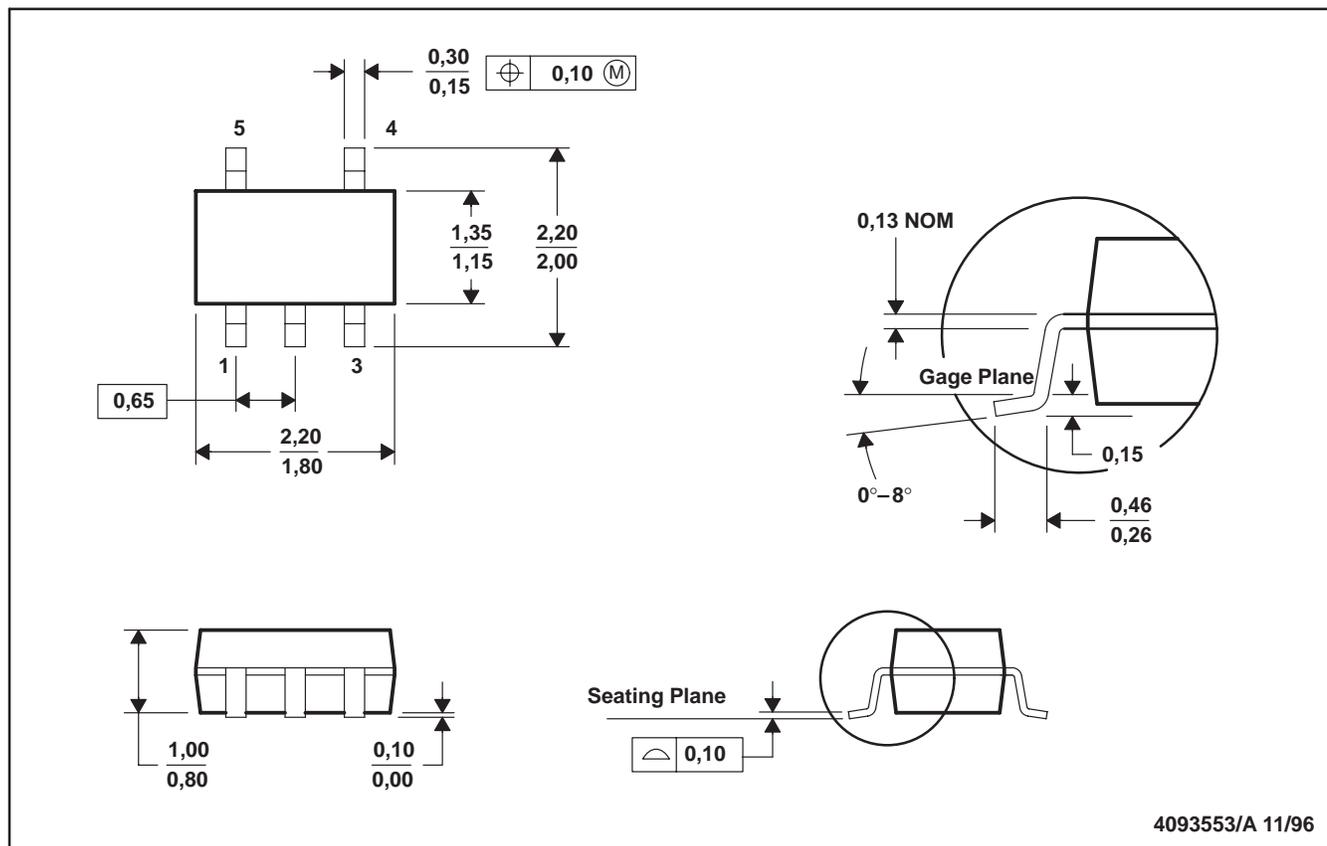
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 ULTRA-SMALL SUPPLY VOLTAGE SUPERVISORS

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MECHANICAL DATA

DCK (R-PDSO-G5)

PLASTIC SMALL-OUTLINE PACKAGE



4093553/A 11/96

- NOTES: A. All linear dimensions are in millimeters.
 B. This drawing is subject to change without notice.
 C. Body dimensions include mold flash or protrusion.

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