

TPS3820-xx, TPS3823-xx, TPS3824-xx, TPS3825-xx, TPS3828-xx PROCESSOR SUPERVISORY CIRCUITS

SLVS165E – APRIL 1998 – REVISED DECEMBER 2002

features

- Power-On Reset Generator With Fixed Delay Time of 200 ms (TPS3823/4/5/8) or 25 ms (TPS3820)
- Manual Reset Input (TPS3820/3/5/8)
- Reset Output Available in Active-Low (TPS3820/3/4/5), Active-High (TPS3824) and Open-Drain (TPS3828)
- Supply Voltage Supervision Range
2.5 V, 3 V, 3.3 V, 5 V
- Watchdog Timer (TPS3820/3/4/8)
- Supply Current of 15 μ A (Typ)
- SOT23-5 Package
- Temperature Range . . . -40°C to 85°C

applications

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

description

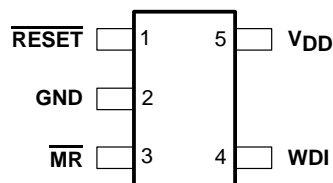
The TPS382x family of supervisors provides circuit initialization and timing supervision, primarily for DSP and processor-based systems.

During power-on, $\overline{\text{RESET}}$ is asserted when supply voltage V_{DD} becomes higher than 1.1 V. Thereafter, the supply voltage supervisor monitors V_{DD} and keeps $\overline{\text{RESET}}$ active as long as V_{DD} remains below the threshold voltage $V_{\text{IT-}}$.

An internal timer delays the return of the output to the inactive state (high) to ensure proper system reset. The delay time, t_{d} , starts after V_{DD} has risen above the threshold voltage $V_{\text{IT-}}$. When the supply voltage drops below the threshold voltage $V_{\text{IT-}}$, the output becomes active (low) again. No external components are required. All the devices of this family have a fixed-sense threshold voltage $V_{\text{IT-}}$ set by an internal voltage divider.

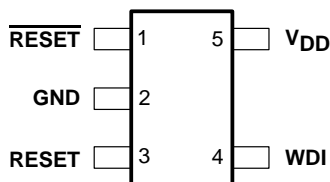
TPS3820, TPS3823, TPS3828 . . . DBV PACKAGE

(TOP VIEW)



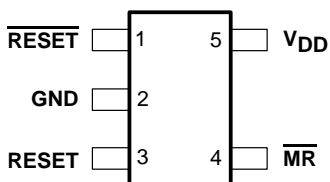
TPS3824 . . . DBV PACKAGE

(TOP VIEW)

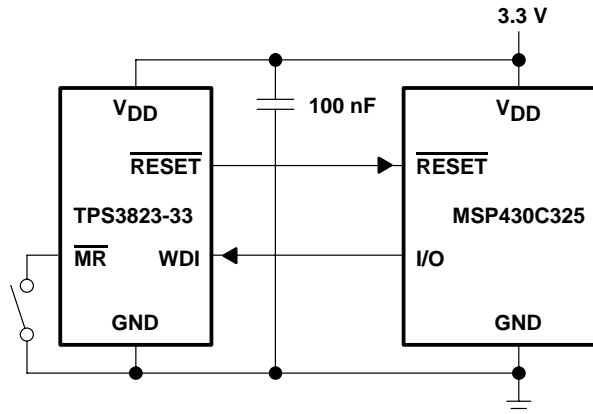


TPS3825 . . . DBV PACKAGE

(TOP VIEW)



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.

This document contains information on products in more than one phase of development. The status of each device is indicated on the page(s) specifying its electrical characteristics.

**TEXAS
INSTRUMENTS**

POST OFFICE BOX 655303 • DALLAS, TEXAS 75265

Copyright © 2002, Texas Instruments Incorporated

TPS3820-xx, TPS3823-xx, TPS3824-xx, TPS3825-xx, TPS3828-xx PROCESSOR SUPERVISORY CIRCUITS

SLVS165E – APRIL 1998 – REVISED DECEMBER 2002

description (continued)

The TPS3820/3/5/8 devices incorporate a manual reset input, \overline{MR} . A low level at \overline{MR} causes \overline{RESET} to become active. The TPS3824/5 devices include a high-level output RESET. TPS3820/3/4/8 have a watchdog timer that is periodically triggered by a positive or negative transition at WDI. When the supervising system fails to retrigger the watchdog circuit within the time-out interval, t_{out} , \overline{RESET} becomes active for the time period t_d . This event also reinitializes the watchdog timer. Leaving WDI unconnected disables the watchdog.

In applications where the input to the WDI pin may be active (transitioning high and low) when the TPS3820/3/4/8 is asserting \overline{RESET} , the TPS3820/3/4/8 does not return to a non-reset state when the input voltage is above V_t . If the application requires that input to WDI is active when \overline{RESET} is asserted, WDI must be decoupled from the active signal. This can be accomplished by using an N-channel FET in series with the WDI pin, with the gate of the FET connected to the \overline{RESET} output as shown in Figure 1.

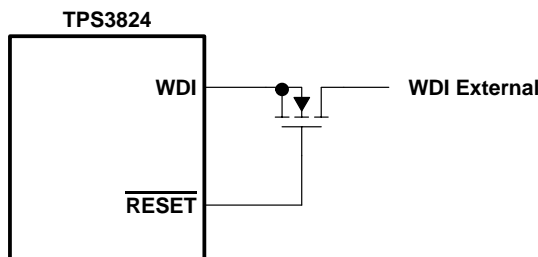


Figure 1

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 SOT23-5 package. The TPS382x devices are characterized for operation over a temperature range of -40°C to 85°C.

PACKAGE INFORMATION

| DEVICE NAME | DEVICE NAME | THRESHOLD VOLTAGE [§] | MARKING |
|-----------------------------|-----------------------------|--------------------------------|---------|
| TPS3820-33DBVT [†] | TPS3820-33DBVR [‡] | 2.93 V | PDEI |
| TPS3820-50DBVT [†] | TPS3820-50DBVR [‡] | 4.55 V | PDDI |
| TPS3823-25DBVT [†] | TPS3823-25DBVR [‡] | 2.25 V | PAPI |
| TPS3823-30DBVT [†] | TPS3823-30DBVR [‡] | 2.63 V | PAQI |
| TPS3823-33DBVT [†] | TPS3823-33DBVR [‡] | 2.93 V | PARI |
| TPS3823-50DBVT [†] | TPS3823-50DBVR [‡] | 4.55 V | PASI |
| TPS3824-25DBVT [†] | TPS3824-25DBVR [‡] | 2.25 V | PATI |
| TPS3824-30DBVT [†] | TPS3824-30DBVR [‡] | 2.63 V | PAUI |
| TPS3824-33DBVT [†] | TPS3824-33DBVR [‡] | 2.93 V | PAVI |
| TPS3824-50DBVT [†] | TPS3824-50DBVR [‡] | 4.55 V | PAWI |
| TPS3825-33DBVT [†] | TPS3825-33DBVR [‡] | 2.93 V | PDGI |
| TPS3825-50DBVT [†] | TPS3825-50DBVR [‡] | 4.55 V | PDFI |
| TPS3828-33DBVT [†] | TPS3828-33DBVR [‡] | 2.93 V | PDII |
| TPS3828-50DBVT [†] | TPS3828-50DBVR [‡] | 4.55 V | PDHI |

[†] The DBVT package indicates tape and reel of 250 parts.

[‡] The DBVR package indicates tape and reel of 3000 parts.

[§] For other threshold voltage versions, please contact the local TI sales office.

TPS3820-xx, TPS3823-xx, TPS3824-xx, TPS3825-xx, TPS3828-xx PROCESSOR SUPERVISORY CIRCUITS

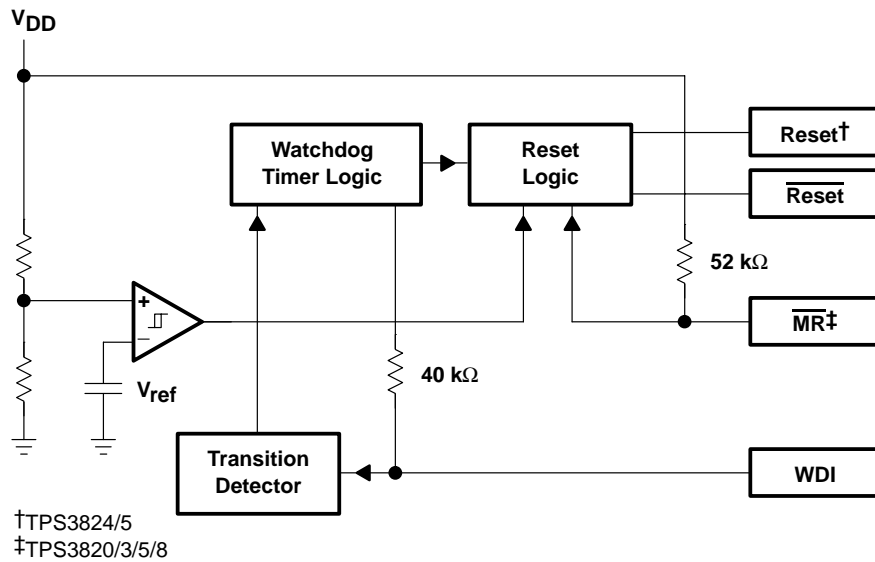
SLVS165E – APRIL 1998 – REVISED DECEMBER 2002

FUNCTION/TRUTH TABLE

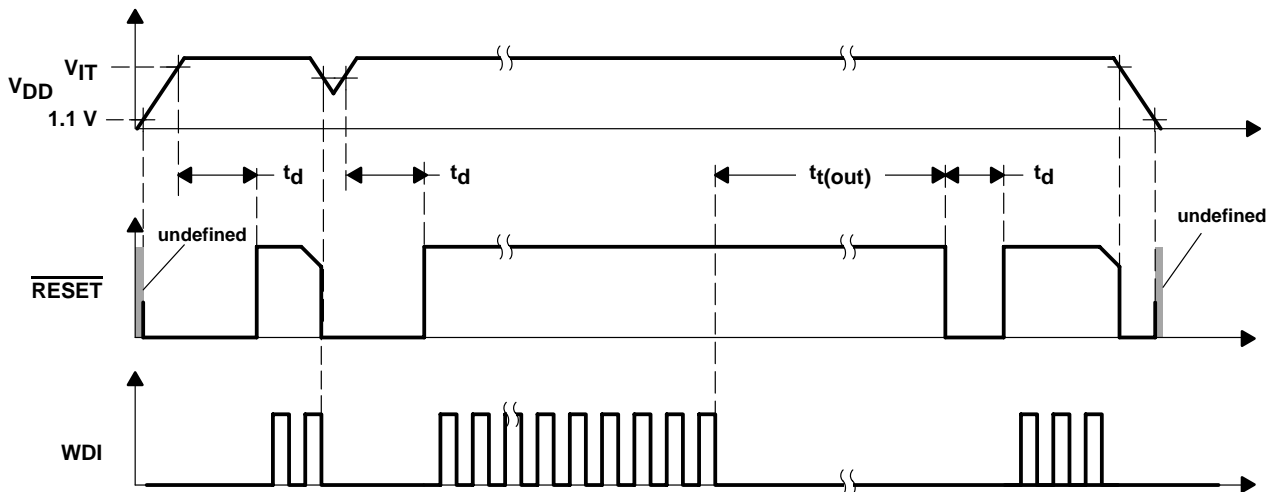
| INPUTS | | OUTPUTS | |
|------------------------|-------------------|--------------------|--------|
| $\overline{MR}\dagger$ | $V_{DD} > V_{IT}$ | \overline{RESET} | RESET# |
| L | 0 | L | H |
| L | 1 | L | H |
| H | 0 | L | H |
| H | 1 | H | L |

† TPS3820/3/5/8
TPS3824/5

functional block diagram



timing diagram



TPS3820-xx, TPS3823-xx, TPS3824-xx, TPS3825-xx, TPS3828-xx PROCESSOR SUPERVISORY CIRCUITS

SLVS165E – APRIL 1998 – REVISED DECEMBER 2002

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

| | |
|--|-------------------------------|
| Supply voltage, V_{DD} (see Note 1) | 6 V |
| RESET, \overline{RESET} , MR, WDI (see Note 1) | -0.3 V to ($V_{DD} + 0.3$ V) |
| Maximum low output current, I_{OL} | 5 mA |
| Maximum high output current, I_{OH} | -5 mA |
| Input clamp current range, I_{IK} ($V_I < 0$ or $V_I > V_{DD}$) | ± 10 mA |
| Output clamp current range, I_{OK} ($V_O < 0$ or $V_O > V_{DD}$) | ± 10 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.

DISSIPATION RATING TABLE

| PACKAGE | $T_A \leq 25^\circ\text{C}$ POWER RATING | OPERATING FACTOR ABOVE $T_A = 25^\circ\text{C}$ | $T_A = 70^\circ\text{C}$ POWER RATING | $T_A = 85^\circ\text{C}$ POWER RATING |
|---------|---|--|--|--|
| DBV | 437 mW | 3.5 mW/°C | 280 mW | 227 mW |

recommended operating conditions

| | MIN | MAX | UNIT |
|--|---------------------|---------------------|------|
| Supply voltage, V_{DD} | 1.1 | 5.5 | V |
| Input voltage, V_I | 0 | $V_{DD} + 0.3$ | V |
| High-level input voltage at \overline{MR} and WDI, 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} or WDI, $\Delta t/\Delta V$ | | 100 | ns/V |
| Operating free-air temperature range, T_A | -40 | 85 | °C |



TPS3820-xx, TPS3823-xx, TPS3824-xx, TPS3825-xx, TPS3828-xx PROCESSOR SUPERVISORY CIRCUITS

SLVS165E – APRIL 1998 – REVISED DECEMBER 2002

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 | RESET | TPS382x-25 | V _{DD} = V _{IT-} + 0.2 V I _{OH} = -20 μA | | V |
| | | | TPS382x-30 TPS382x-33 | V _{DD} = V _{IT-} + 0.2 V I _{OH} = -30 μA | | |
| | | | TPS382x-50 | V _{DD} = V _{IT-} + 0.2 V I _{OH} = -120 μA | | |
| | TPS3824-25 TPS3825-25 | RESET | V _{DD} ≥ 1.8 V, I _{OH} = -100 μA | | V | |
| | TPS3824-30 TPS3825-30 | | V _{DD} ≥ 1.8 V, I _{OH} = -150 μA | | | |
| | TPS3824-33 TPS3825-33 | | | | | |
| | TPS3824-50 TPS3825-50 | | | | | |
| | V _{OL} | Low-level output voltage | RESET | TPS3824-25 TPS3825-25 | V _{DD} = V _{IT-} + 0.2 V I _{OL} = 1 mA | |
| TPS3824-30 TPS3825-30 | | | | V _{DD} = V _{IT-} + 0.2 V I _{OL} = 1.2 mA | | |
| TPS3824-33 TPS3825-33 | | | | | | |
| TPS3824-50 TPS3825-50 | | | | V _{DD} = V _{IT-} + 0.2 V I _{OL} = 3 mA | | |
| RESET | | TPS382x-25 | V _{DD} = V _{IT-} - 0.2 V I _{OL} = 1 mA | | V | |
| | | TPS382x-30 TPS382x-33 | V _{DD} = V _{IT-} - 0.2 V I _{OL} = 1.2 mA | | | |
| | | TPS382x-50 | V _{DD} = V _{IT-} - 0.2 V I _{OL} = 3 mA | | | |
| | | Power-up reset voltage (see Note 2) | | V _{DD} ≥ 1.1 V, I _{OL} = 20 μA | | V |
| V _{IT-} | Negative-going input threshold voltage (see Note 3) | RESET | TPS382x-25 | T _A = 0°C – 85°C | | V |
| | | | TPS382x-30 | | | |
| | | | TPS382x-33 | | | |
| | | | TPS382x-50 | | | |
| | TPS382x-25 | RESET | T _A = -40°C – 85°C | | V | |
| | TPS382x-30 | | | | | |
| | TPS382x-33 | | | | | |
| | TPS382x-50 | | | | | |
| V _{hys} | Hysteresis at V _{DD} input | RESET | TPS382x-25 | 30 | | mV |
| | | | TPS382x-30 | | | |
| | | | TPS382x-33 | | | |
| | | | TPS382x-50 | 50 | | |

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 (ceramic, 0.1 μF) should be placed near the supply terminals.



TPS3820-xx, TPS3823-xx, TPS3824-xx, TPS3825-xx, TPS3828-xx PROCESSOR SUPERVISORY CIRCUITS

SLVS165E – APRIL 1998 – REVISED DECEMBER 2002

electrical characteristics over recommended operating free-air temperature range (unless otherwise noted) (continued)

| PARAMETER | | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---------------------|--|--|---|---|---------|------|
| I _{IH(AV)} | Average high-level input current | WDI | WDI = V _{DD} , time average (dc = 88%) | | 120 | μA |
| | | | WDI = 0.3 V, V _{DD} = 5.5 V time average (dc = 12%) | | -15 | |
| I _{IH} | High-level input current | WDI | WDI = V _{DD} | | 140 190 | |
| | | | MR | MR = V _{DD} × 0.7, V _{DD} = 5.5 V | | |
| I _{IL} | Low-level input current | WDI | WDI = 0.3 V, V _{DD} = 5.5 V | | 140 190 | |
| | | | MR | MR = 0.3 V, V _{DD} = 5.5 V | | |
| I _{OS} | Output short-circuit current (see Note 4) | RESET | TPS382x-25 | V _{DD} = V _{IT, max} + 0.2 V, V _O = 0 V | | -400 |
| | | | TPS382x-30 | | | |
| | | | TPS382x-33 | | | |
| | | | TPS382x-50 | | | |
| I _{DD} | Supply current | WDI and MR unconnected, Outputs unconnected | | 15 | 25 | μA |
| | Internal pullup resistor at MR | | | 52 | | kΩ |
| C _i | Input capacitance at MR, WDI | V _I = 0 V to 5.5 V | | 5 | | pF |

NOTE 4: The RESET short-circuit current is the maximum pullup current when RESET is driven low by a μP bidirectional reset pin.

timing requirements at 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 | | 6 | μs |
| | | at MR | V _{DD} ≥ V _{IT-} + 0.2 V, V _{IL} = 0.3 × V _{DD} , V _{IH} = 0.7 × V _{DD} | | 1 | μs |
| | | at WDI | 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 _{tout} | Watchdog time out | TPS3820 | 112 | 200 | 310 | ms |
| | | TPS3823/4/8 | 0.9 | 1.6 | 2.5 | s |
| t _d | Delay time | TPS3820 | 15 | 25 | 37 | ms |
| | | TPS3823/4/5/8 | 120 | 200 | 300 | |
| t _{PHL} | Propagation (delay) time, high-to-low-level output | MR to RESET delay (TPS3820/3/5/8) | V _{DD} ≥ V _{IT-} + 0.2 V, V _{IL} = 0.3 × V _{DD} , V _{IH} = 0.7 × V _{DD} | | 0.1 | μs |
| | | V _{DD} to RESET delay | V _{IL} = V _{IT-} - 0.2 V, V _{IH} = V _{IT-} + 0.2 V | | 25 | |
| t _{PLH} | Propagation (delay) time, low-to-high-level output | MR to RESET delay (TPS3824/5) | V _{DD} ≥ V _{IT-} + 0.2 V, V _{IL} = 0.3 × V _{DD} , V _{IH} = 0.7 × V _{DD} | | 0.1 | μs |
| | | V _{DD} to RESET delay (TPS3824/5) | V _{IL} = V _{IT-} - 0.2 V, V _{IH} = V _{IT-} + 0.2 V | | 25 | |



TYPICAL CHARACTERISTICS

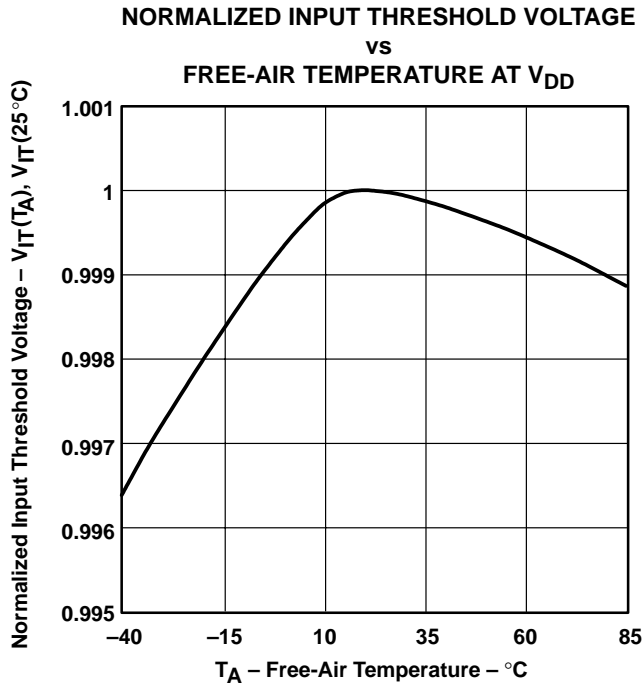


Figure 2

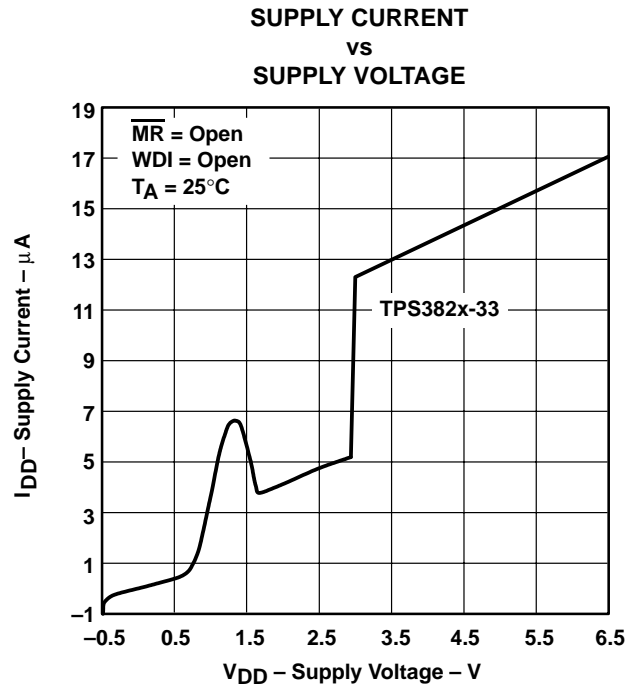


Figure 3

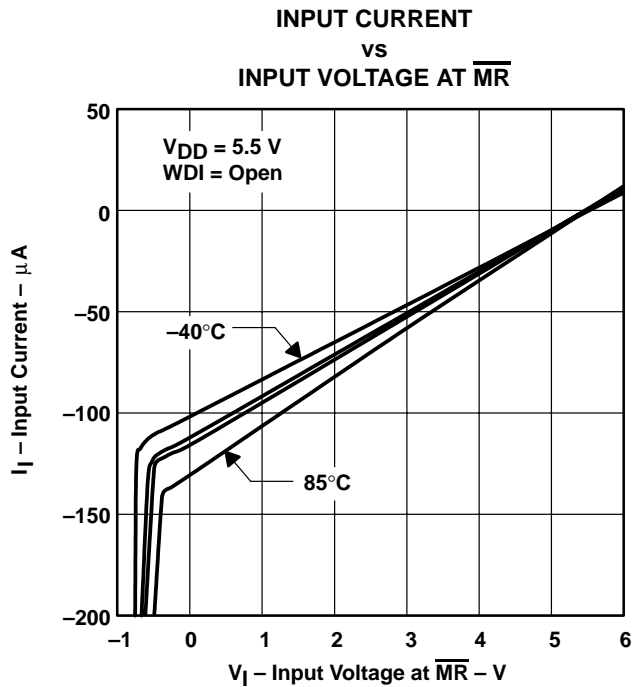


Figure 4

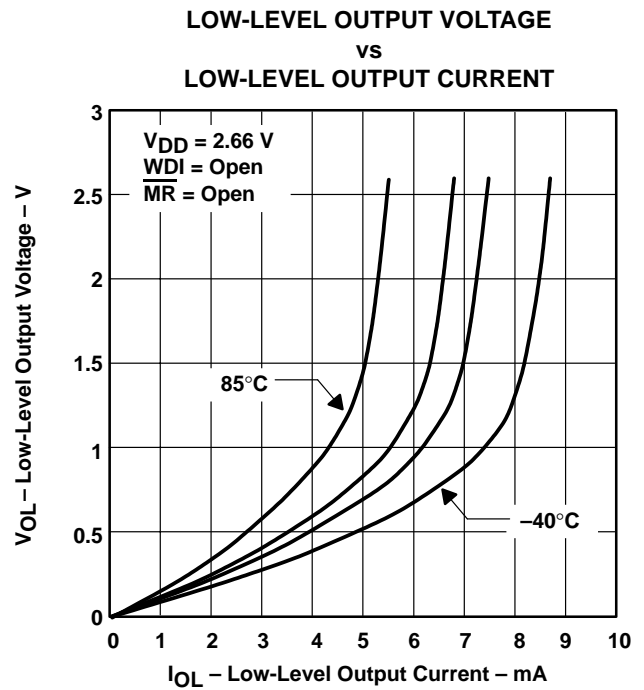
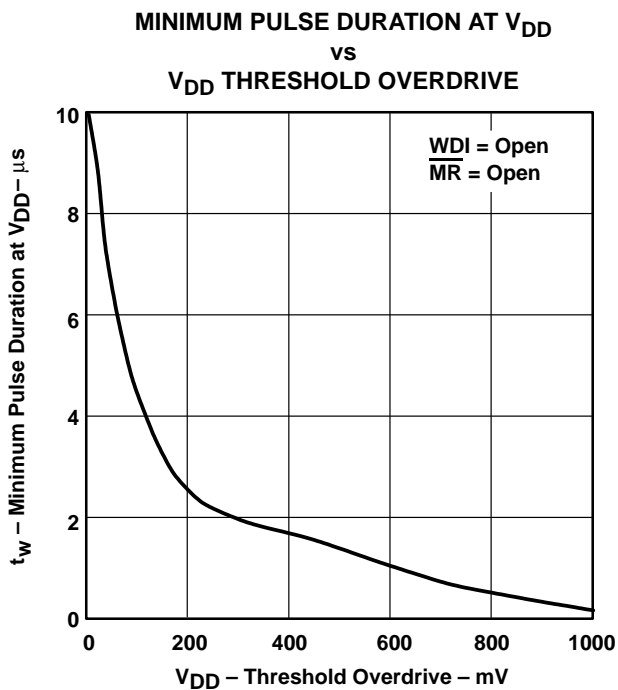
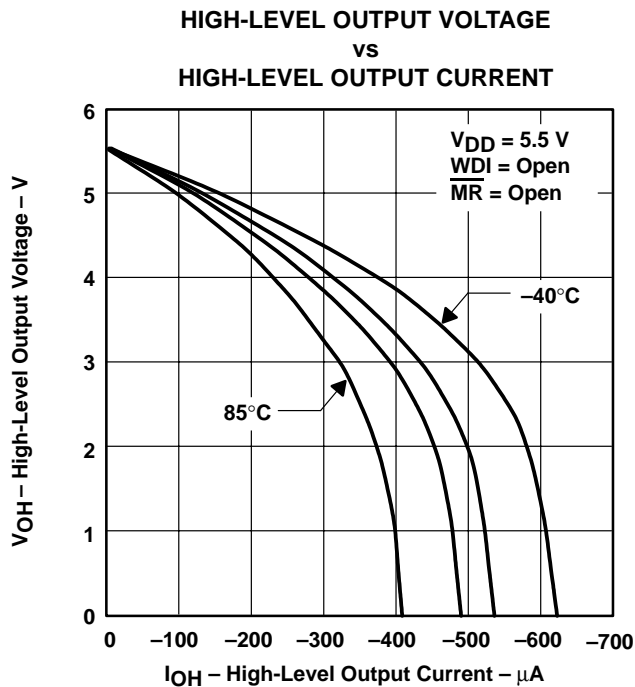
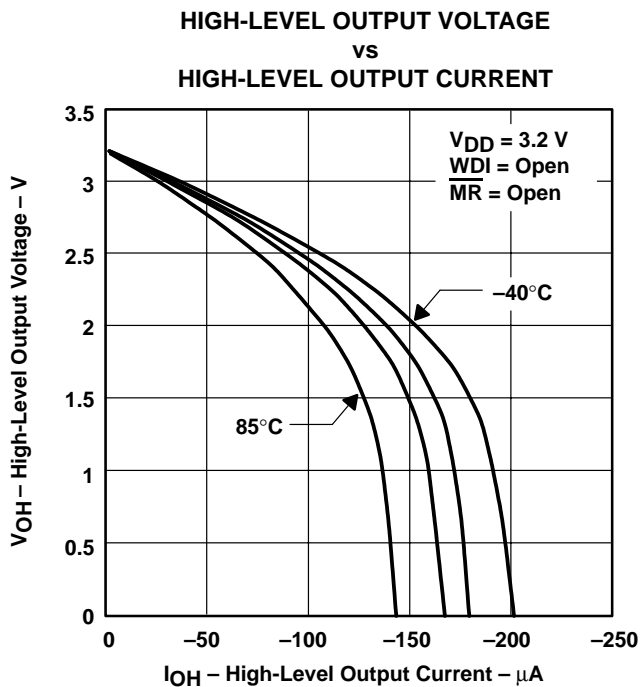


Figure 5

TPS3820-xx, TPS3823-xx, TPS3824-xx, TPS3825-xx, TPS3828-xx PROCESSOR SUPERVISORY CIRCUITS

SLVS165E – APRIL 1998 – REVISED DECEMBER 2002

TYPICAL CHARACTERISTICS



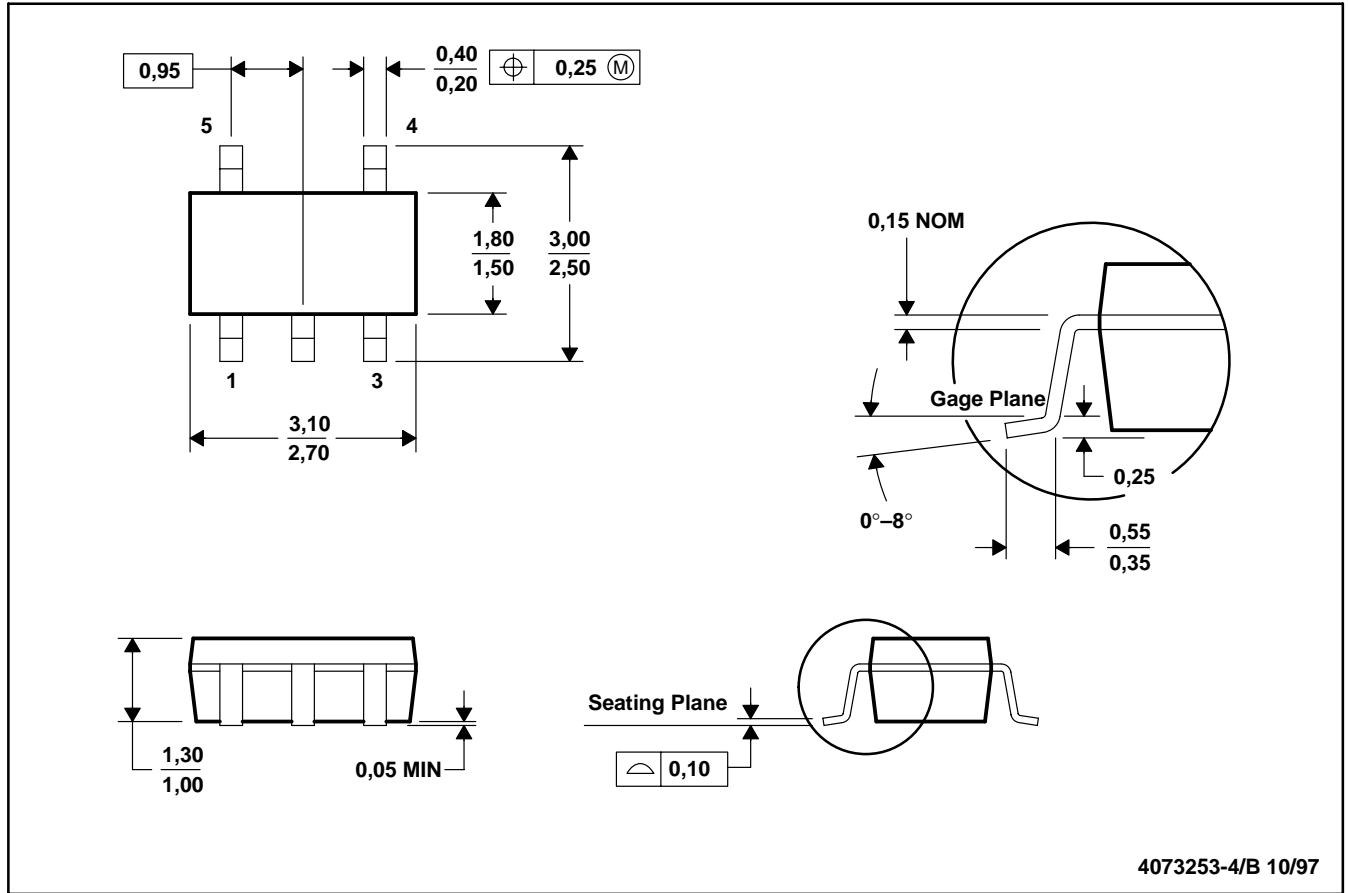
TPS3820-xx, TPS3823-xx, TPS3824-xx, TPS3825-xx, TPS3828-xx
PROCESSOR SUPERVISORY CIRCUITS

SLVS165E – APRIL 1998 – REVISED DECEMBER 2002

MECHANICAL DATA

DBV (R-PDSO-G5)

PLASTIC SMALL-OUTLINE PACKAGE



- 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.

PACKAGING INFORMATION

| Orderable Device | Status ⁽¹⁾ | Package Type | Package Drawing | Pins | Package Qty | Eco Plan ⁽²⁾ | Lead/Ball Finish | MSL Peak Temp ⁽³⁾ |
|------------------|-----------------------|--------------|-----------------|------|-------------|-------------------------|------------------|------------------------------|
| TPS3820-33DBVR | ACTIVE | SOT-23 | DBV | 5 | 3000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| TPS3820-33DBVRG4 | ACTIVE | SOT-23 | DBV | 5 | 3000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| TPS3820-33DBVT | ACTIVE | SOT-23 | DBV | 5 | 250 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR |
| TPS3820-33DBVTG4 | ACTIVE | SOT-23 | DBV | 5 | 250 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR |
| TPS3820-50DBVR | ACTIVE | SOT-23 | DBV | 5 | 3000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR |
| TPS3820-50DBVRG4 | ACTIVE | SOT-23 | DBV | 5 | 3000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR |
| TPS3820-50DBVT | ACTIVE | SOT-23 | DBV | 5 | 250 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR |
| TPS3820-50DBVTG4 | ACTIVE | SOT-23 | DBV | 5 | 250 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR |
| TPS3823-25DBVR | ACTIVE | SOT-23 | DBV | 5 | 3000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR |
| TPS3823-25DBVRG4 | ACTIVE | SOT-23 | DBV | 5 | 3000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR |
| TPS3823-25DBVT | ACTIVE | SOT-23 | DBV | 5 | 250 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR |
| TPS3823-30DBVR | ACTIVE | SOT-23 | DBV | 5 | 3000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR |
| TPS3823-30DBVRG4 | ACTIVE | SOT-23 | DBV | 5 | 3000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR |
| TPS3823-30DBVT | ACTIVE | SOT-23 | DBV | 5 | 250 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR |
| TPS3823-30DBVTG4 | ACTIVE | SOT-23 | DBV | 5 | 250 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR |
| TPS3823-33DBVR | ACTIVE | SOT-23 | DBV | 5 | 3000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR |
| TPS3823-33DBVRG4 | ACTIVE | SOT-23 | DBV | 5 | 3000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR |
| TPS3823-33DBVT | ACTIVE | SOT-23 | DBV | 5 | 250 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR |
| TPS3823-33DBVTG4 | ACTIVE | SOT-23 | DBV | 5 | 250 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR |
| TPS3823-50DBVR | ACTIVE | SOT-23 | DBV | 5 | 3000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR |
| TPS3823-50DBVRG4 | ACTIVE | SOT-23 | DBV | 5 | 3000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR |
| TPS3823-50DBVT | ACTIVE | SOT-23 | DBV | 5 | 250 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR |
| TPS3823-50DBVTG4 | ACTIVE | SOT-23 | DBV | 5 | 250 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR |
| TPS3824-25DBVR | ACTIVE | SOT-23 | DBV | 5 | 3000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR |
| TPS3824-25DBVRG4 | ACTIVE | SOT-23 | DBV | 5 | 3000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR |

| Orderable Device | Status ⁽¹⁾ | Package Type | Package Drawing | Pins | Package Qty | Eco Plan ⁽²⁾ | Lead/Ball Finish | MSL Peak Temp ⁽³⁾ |
|------------------|-----------------------|--------------|-----------------|------|-------------|-------------------------|------------------|------------------------------|
| TPS3824-25DBVT | ACTIVE | SOT-23 | DBV | 5 | 250 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR |
| TPS3824-30DBVR | ACTIVE | SOT-23 | DBV | 5 | 3000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR |
| TPS3824-30DBVRG4 | ACTIVE | SOT-23 | DBV | 5 | 3000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR |
| TPS3824-30DBVT | ACTIVE | SOT-23 | DBV | 5 | 250 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR |
| TPS3824-30DBVTG4 | ACTIVE | SOT-23 | DBV | 5 | 250 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR |
| TPS3824-33DBVR | ACTIVE | SOT-23 | DBV | 5 | 3000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR |
| TPS3824-33DBVRG4 | ACTIVE | SOT-23 | DBV | 5 | 3000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR |
| TPS3824-33DBVT | ACTIVE | SOT-23 | DBV | 5 | 250 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR |
| TPS3824-50DBVR | ACTIVE | SOT-23 | DBV | 5 | 3000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR |
| TPS3824-50DBVRG4 | ACTIVE | SOT-23 | DBV | 5 | 3000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR |
| TPS3824-50DBVT | ACTIVE | SOT-23 | DBV | 5 | 250 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR |
| TPS3824-50DBVTG4 | ACTIVE | SOT-23 | DBV | 5 | 250 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR |
| TPS3825-33DBVR | ACTIVE | SOT-23 | DBV | 5 | 3000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR |
| TPS3825-33DBVRG4 | ACTIVE | SOT-23 | DBV | 5 | 3000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR |
| TPS3825-33DBVT | ACTIVE | SOT-23 | DBV | 5 | 250 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR |
| TPS3825-33DBVTG4 | ACTIVE | SOT-23 | DBV | 5 | 250 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR |
| TPS3825-50DBVR | ACTIVE | SOT-23 | DBV | 5 | 3000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR |
| TPS3825-50DBVRG4 | ACTIVE | SOT-23 | DBV | 5 | 3000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR |
| TPS3825-50DBVT | ACTIVE | SOT-23 | DBV | 5 | 250 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR |
| TPS3825-50DBVTG4 | ACTIVE | SOT-23 | DBV | 5 | 250 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR |
| TPS3828-33DBVR | ACTIVE | SOT-23 | DBV | 5 | 3000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR |
| TPS3828-33DBVRG4 | ACTIVE | SOT-23 | DBV | 5 | 3000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| TPS3828-33DBVT | ACTIVE | SOT-23 | DBV | 5 | 250 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR |
| TPS3828-33DBVTG4 | ACTIVE | SOT-23 | DBV | 5 | 250 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR |
| TPS3828-50DBVR | ACTIVE | SOT-23 | DBV | 5 | 3000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR |
| TPS3828-50DBVRG4 | ACTIVE | SOT-23 | DBV | 5 | 3000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR |

| Orderable Device | Status ⁽¹⁾ | Package Type | Package Drawing | Pins | Package Qty | Eco Plan ⁽²⁾ | Lead/Ball Finish | MSL Peak Temp ⁽³⁾ |
|------------------|-----------------------|--------------|-----------------|------|-------------|-------------------------|------------------|------------------------------|
| TPS3828-50DBVT | ACTIVE | SOT-23 | DBV | 5 | 250 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR |
| TPS3828-50DBVTG4 | ACTIVE | SOT-23 | DBV | 5 | 250 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR |

⁽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.

OBSELETE: TI has discontinued the production of the device.

⁽²⁾ Eco Plan - May not be currently available - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

None: Not yet available Lead (Pb-Free).

Pb-Free (RoHS): TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

Green (RoHS & no Sb/Br): TI defines "Green" to mean "Pb-Free" and in addition, uses package materials that do not contain halogens, including bromine (Br) or antimony (Sb) above 0.1% of total product weight.

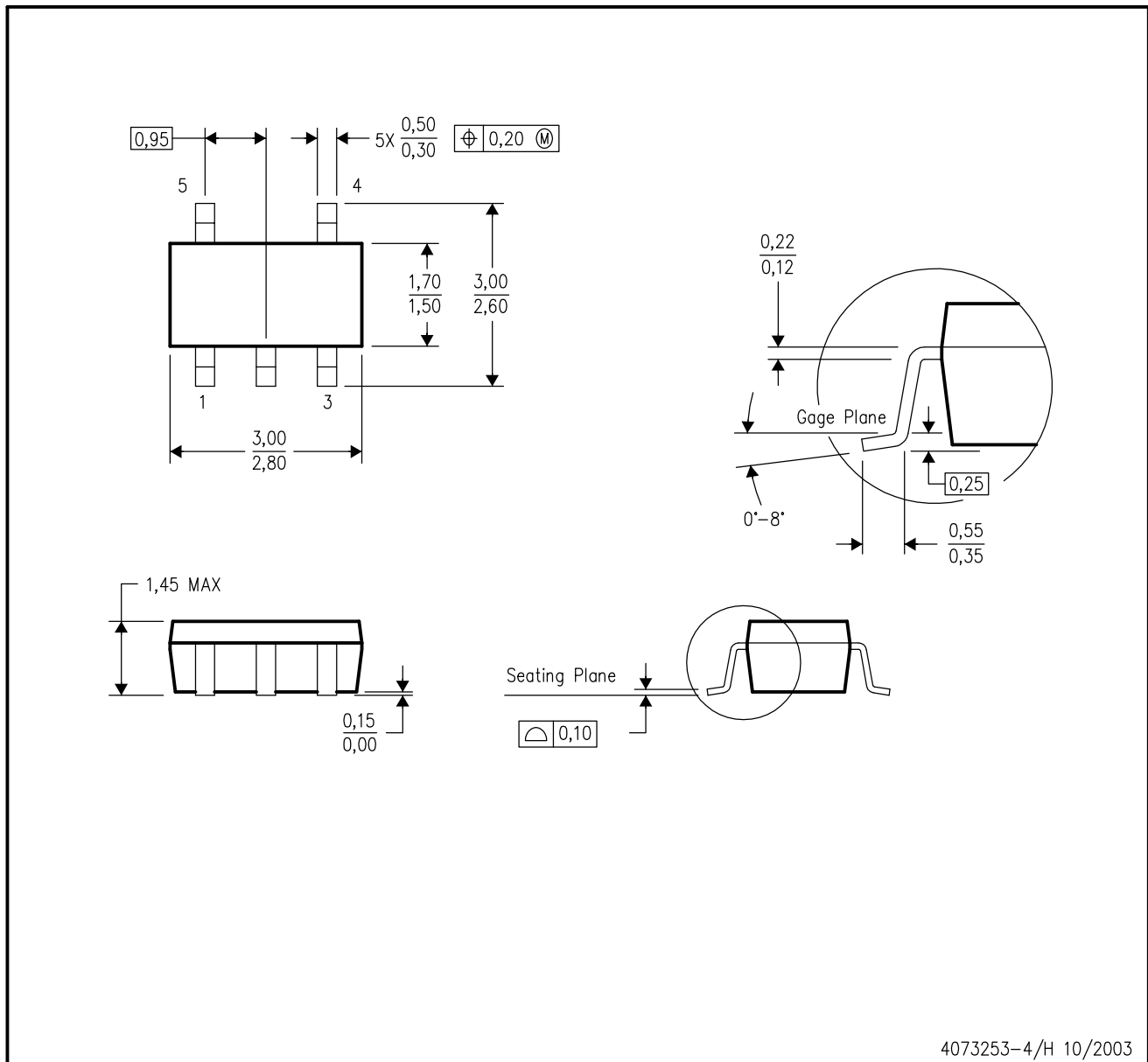
⁽³⁾ MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

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.

DBV (R-PDSO-G5)

PLASTIC SMALL-OUTLINE PACKAGE



- 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.
 - D. Falls within JEDEC MO-178 Variation AA.

IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, modifications, enhancements, improvements, and other changes to its products and services at any time and to discontinue any product or service without notice. Customers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All products are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its hardware products to the specifications applicable at the time of sale in accordance with TI's standard warranty. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by government requirements, testing of all parameters of each product is not necessarily performed.

TI assumes no liability for applications assistance or customer product design. Customers are responsible for their products and applications using TI components. To minimize the risks associated with customer products and applications, customers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any TI patent right, copyright, mask work right, or other TI intellectual property right relating to any combination, machine, or process in which TI products or services are used. Information published by TI regarding third-party products or services does not constitute a license from TI to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

Reproduction of information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. Reproduction of this information with alteration is an unfair and deceptive business practice. TI is not responsible or liable for such altered documentation.

Resale of TI products or services with statements different from or beyond the parameters stated by TI for that product or service voids all express and any implied warranties for the associated TI product or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

Following are URLs where you can obtain information on other Texas Instruments products and application solutions:

| Products | | Applications | |
|------------------|--|---------------------|--|
| Amplifiers | amplifier.ti.com | Audio | www.ti.com/audio |
| Data Converters | dataconverter.ti.com | Automotive | www.ti.com/automotive |
| DSP | dsp.ti.com | Broadband | www.ti.com/broadband |
| Interface | interface.ti.com | Digital Control | www.ti.com/digitalcontrol |
| Logic | logic.ti.com | Military | www.ti.com/military |
| Power Mgmt | power.ti.com | Optical Networking | www.ti.com/opticalnetwork |
| Microcontrollers | microcontroller.ti.com | Security | www.ti.com/security |
| | | Telephony | www.ti.com/telephony |
| | | Video & Imaging | www.ti.com/video |
| | | Wireless | www.ti.com/wireless |

Mailing Address: Texas Instruments
Post Office Box 655303 Dallas, Texas 75265