## features

- Single Voltage Detector (TPS3803): Adjustable/1.5 V
- Dual Voltage Detector (TPS3805): Adjustable/3.3 V
- High ±1.5% Threshold Voltage Accuracy
- Supply Current: 3 μA Typical at $V_{DD}$ = 3.3 V
- Push/Pull Reset Output (TPS3805) Open-Drain Reset Output (TPS3803)
- Temperature Range . . . –40°C to 85°C
- Five-Pin SC–70 Package

## description

The TPS3803 and TPS3805 families of supervisory circuits provide circuit initialization and timing supervision, primarily for DSPs and processor-based systems.

The TPS3803G15 device has a fixed-sense threshold voltage $V_{IT}$ set by an internal voltage divider, whereas the TPS3803–01 has an adjustable SENSE input that can be configured by two external resistors. In addition to the fixed sense threshold monitored at $V_{DD}$, the TPS3805 devices provide a second adjustable SENSE input. $\overline{\text{RESET}}$ is asserted in case any of the two voltages drops below $V_{IT}$.

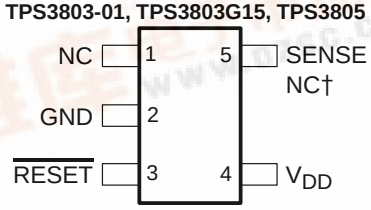
During power on, $\overline{\text{RESET}}$ is asserted when supply voltage $V_{DD}$ becomes higher than 0.8 V. Thereafter, the supervisory circuit monitors $V_{DD}$ (and/or SENSE) and keeps $\overline{\text{RESET}}$ active as long as $V_{DD}$ or SENSE remains below the threshold voltage $V_{IT}$. As soon as $V_{DD}$ (SENSE) rises above the threshold voltage $V_{IT}$, $\overline{\text{RESET}}$ is deasserted again. The product spectrum is designed for 1.5 V, 3.3 V, and adjustable supply voltages. The devices are available in a five-pin SC-70 package. The TPS3803 and TPS3805 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

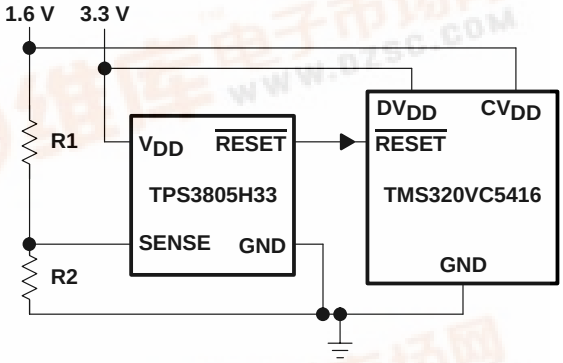
**DCK PACKAGE**
**(TOP VIEW)**

**TPS3803-01, TPS3803G15, TPS3805**




†TPS3803G15

## typical operating circuit

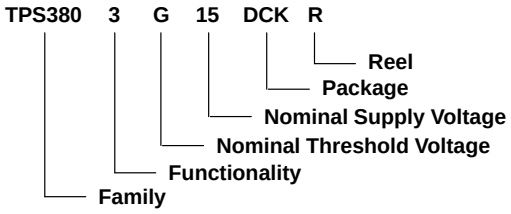


**PACKAGE INFORMATION**

| $T_A$ | DEVICE NAME | THRESHOLD VOLTAGE | | MARKING |
|---|---|---|---|---|
| | | $V_{DD}$ | SENSE | |
| –40°C to 85°C | TPS3803–01DCKR† | NA | 1.226 V | AWG |
| | TPS3803G15DCKR† | 1.40 V | NA | AWI |
| | TPS3805H33DCKR† | 3.05 V | 1.226 V | AWK |

† The DCKR passive indicates tape and reel containing 3000 parts.

## ordering information

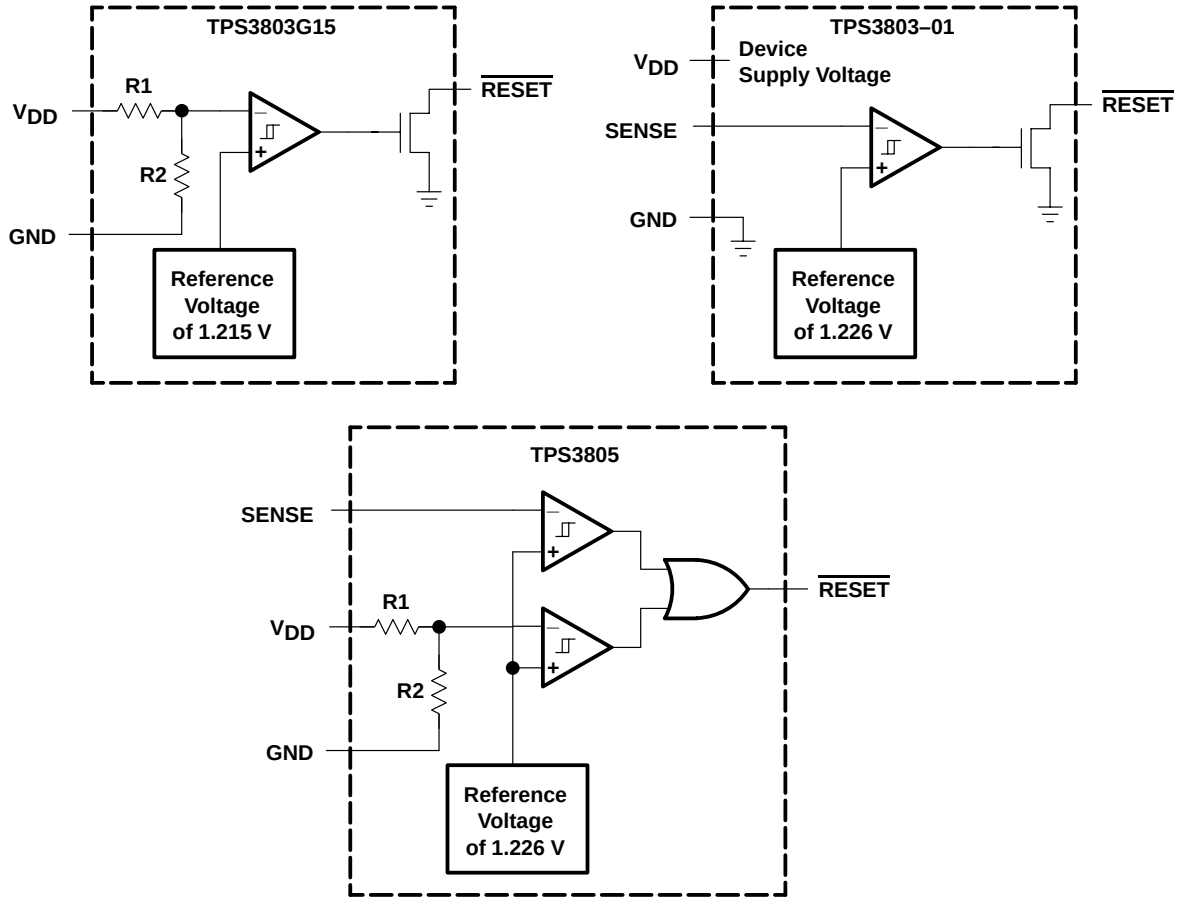



### Function/Truth Tables

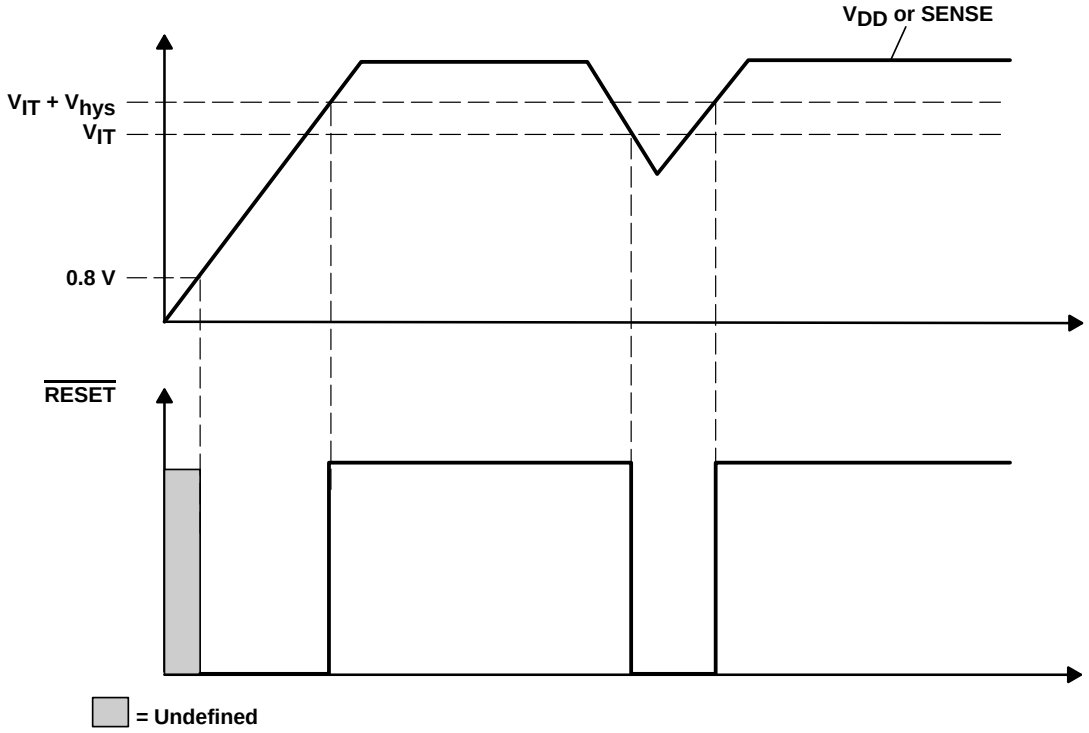
| TPS3803-01 | | TPS3803G15 | |
|---|---|---|---|
| SENSE > $V_{IT}$ | $\overline{\text{RESET}}$ | $V_{DD}$ > $V_{IT}$ | $\overline{\text{RESET}}$ |
| 0 | L | 0 | L |
| 1 | H | 1 | H |

| TPS3805H33 | | |
|---|---|---|
| $V_{DD}$ > $V_{IT}$ | SENSE > $V_{IT}$ | $\overline{\text{RESET}}$ |
| 0 | 0 | L |
| 0 | 1 | L |
| 1 | 0 | L |
| 1 | 1 | H |

## functional block diagram



## timing requirements




### Terminal Functions

| TERMINAL NAME | NO. | I/O | DESCRIPTION |
|---|---|---|---|
| GND | 2 | I | Ground |
| $\overline{\text{RESET}}$ | 3 | O | Active-low reset output (TPS3803—open–drain, TPS3805—push/pull) |
| SENSE | 5 | I | Adjustable sense input |
| NC | 1 | | No internal connection |
| NC (TPS3803G15) | 5 | | No internal connection |
| $V_{DD}$ | 4 | I | Input supply voltage, fixed sense input for TPS3803G15 and TPS3805 |

## 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 $V_I$>$V_{DD}$) . . . . . ±10 mA
Output clamp current, $I_{OK}$ ($V_O$<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. For reliable operation the device should not be continuously operated at 7 V for more than t=1000 h.

**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 |
|---|---|---|---|---|
| DCK | 321 mW | 2.6 mW/°C | 206 mW | 167 mW |

## recommended operating conditions

| | MIN | MAX | UNIT |
|---|---|---|---|
| Supply voltage, $V_{DD}$ | 1.3 | 6 | V |
| Input voltage, $V_I$ | 0 | $V_{DD}$+0.3 | 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 (TPS3805 only) | | $V_{DD}$ = 1.5 V, | $I_{OH}$ = –0.5 mA | 0.8x$V_{DD}$ | | | V |
| | | | $V_{DD}$ = 3.3 V, | $I_{OH}$ = –1.0 mA | | | | |
| | | | $V_{DD}$ = 6 V, | $I_{OH}$ = –1.5 mA | | | | |
| $V_{OL}$ | Low-level output voltage | | $V_{DD}$ = 1.5 V, | $I_{OL}$ = 1.0 mA | | | 0.3 | V |
| | | | $V_{DD}$ = 3.3 V, | $I_{OL}$ = 2 mA | | | | |
| | | | $V_{DD}$ = 6 V, | $I_{OL}$ = 3 mA | | | | |
| | Power-up reset voltage (see Note 2) | $V_{IT}$ > 1.5 V, $T_A$ = 25°C | | | 0.8 | | | V |
| | | $V_{IT}$ ≤ 1.5 V, $T_A$ = 25°C | | | 1.0 | | | V |
| $V_{IT}$ | Negative-going input threshold voltage (see Note 3) | SENSE | $T_A$ = –40°C to 85°C | | 1.208 | 1.226 | 1.244 | V |
| | | TPS3803G15 | | | 1.379 | 1.4 | 1.421 | |
| | | TPS3805H33 | | | 3.004 | 3.05 | 3.096 | |
| $V_{hys}$ | Hysteresis | | 1.2 V < $V_{IT}$ < 2.5 V | | | 15 | | mV |
| | | | 2.5 V < $V_{IT}$ < 3.5 V | | | 30 | | |
| $I_I$ | Input current | SENSE | | | –25 | | 25 | nA |
| $I_{OH}$ | High-level output current at $\overline{\text{RESET}}$ | Open drain only | $V_{DD}$=$V_{IT}$+0.2V, $V_{OH}$=$V_{DD}$ | | | | 300 | nA |
| $I_{DD}$ | Supply current | TPS3803–01 | $V_{DD}$=3.3 V, output unconnected | | | 2 | 4 | µA |
| | | TPS3805, TPS3803G15 | | | | 3 | 5 | |
| | | TPS3803–01 | $V_{DD}$=6 V, output unconnected | | | 2 | 4 | |
| | | TPS3805, TPS3803G15 | | | | 4 | 6 | |
| $C_I$ | Input capacitance | | $V_I$= 0 V to $V_{DD}$ | | | 1 | | pF |

NOTES: 2. The lowest supply voltage at which $\overline{\text{RESET}}$ ($V_{OL}$(max) = 0.2 V, $I_{OL}$ = 50 µA) becomes active. $t_{r(V_{DD})} \geq 15$ µs/V
3. To ensure the best stability of the threshold voltage, place a bypass capacitor (ceramic, 0.1 µF) near the supply terminals.

## timing requirements at $R_L$ = 1 MΩ, $C_L$ = 50 pF, $T_A$ = –40°C to 85°C

| PARAMETER | | | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|---|
| $t_w$ | Pulse width | At $V_{DD}$ | $V_{IH}$ = 1.05 x $V_{IT}$, $V_{IL}$ = 0.95 x $V_{IT}$ | 5.5 | | | µs |
| | | At SENSE | | | | | |

## switching characteristics at $R_L$ = 1 MΩ, $C_L$ = 50 pF, $T_A$ = –40°C to 85°C

| PARAMETER | | | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|---|
| $t_{PHL}$ | Propagation (delay) time, high-to-low-level output | $V_{DD}$ to $\overline{\text{RESET}}$ delay | $V_{IH}$ = 1.05 x $V_{IT}$, $V_{IL}$ = 0.95 x $V_{IT}$ | | 5 | 100 | µs |
| | | SENSE to $\overline{\text{RESET}}$ delay | | | | | |
| $t_{PLH}$ | Propagation (delay) time, low-to-high-level output | $V_{DD}$ to $\overline{\text{RESET}}$ delay | | | 5 | 100 | |
| | | SENSE to $\overline{\text{RESET}}$ delay | | | | | |

## TYPICAL CHARACTERISTICS

**TPS3805H33
SUPPLY CURRENT
vs
SUPPLY VOLTAGE**

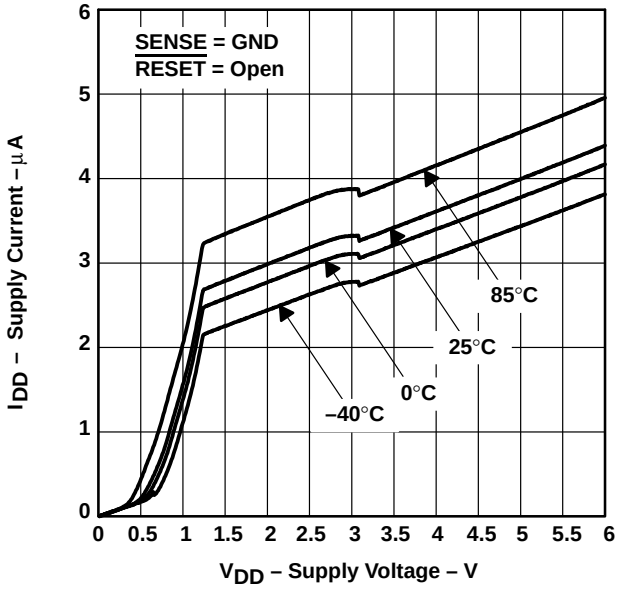



**Figure 1**

**TPS3803–01
SUPPLY CURRENT
vs
SUPPLY VOLTAGE**

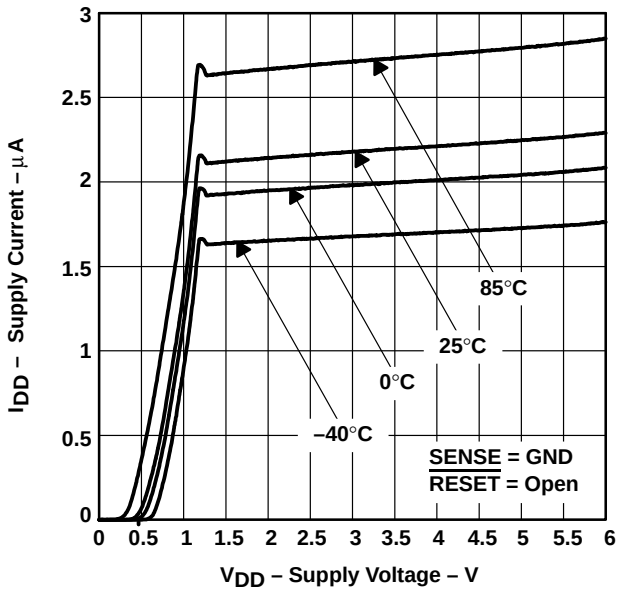



**Figure 2**

**LOW-LEVEL OUTPUT VOLTAGE
vs
LOW-LEVEL OUTPUT CURRENT**

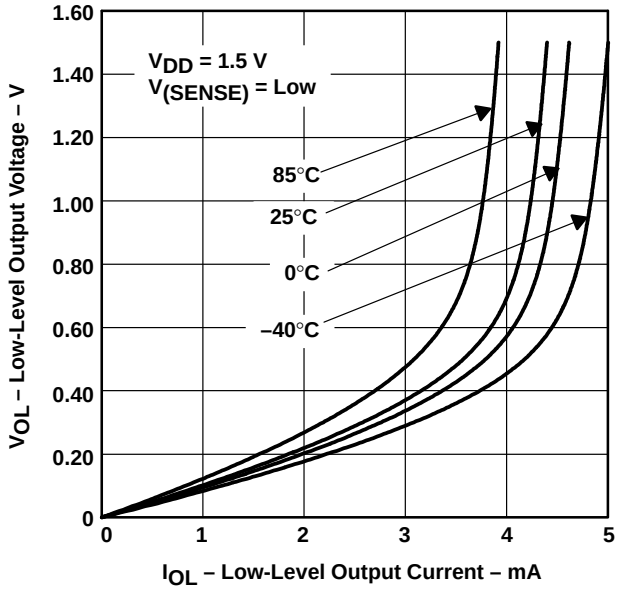



**Figure 3**

**LOW-LEVEL OUTPUT VOLTAGE
vs
LOW-LEVEL OUTPUT CURRENT**

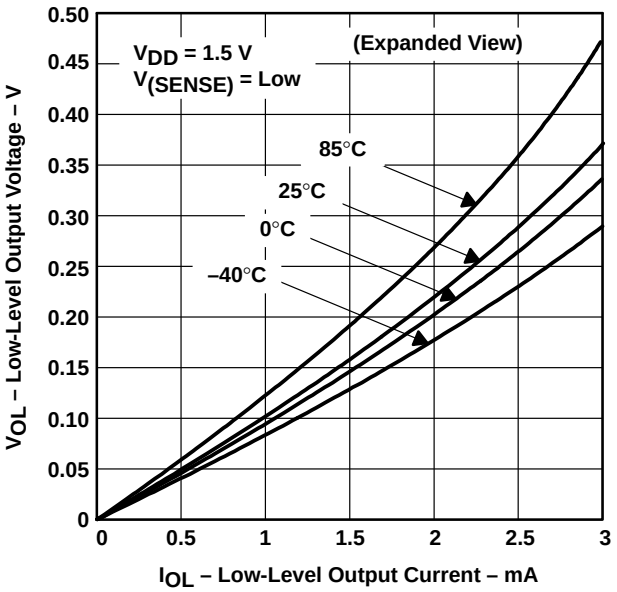



**Figure 4**

## TYPICAL CHARACTERISTICS

LOW-LEVEL OUTPUT VOLTAGE
vs
LOW-LEVEL OUTPUT CURRENT

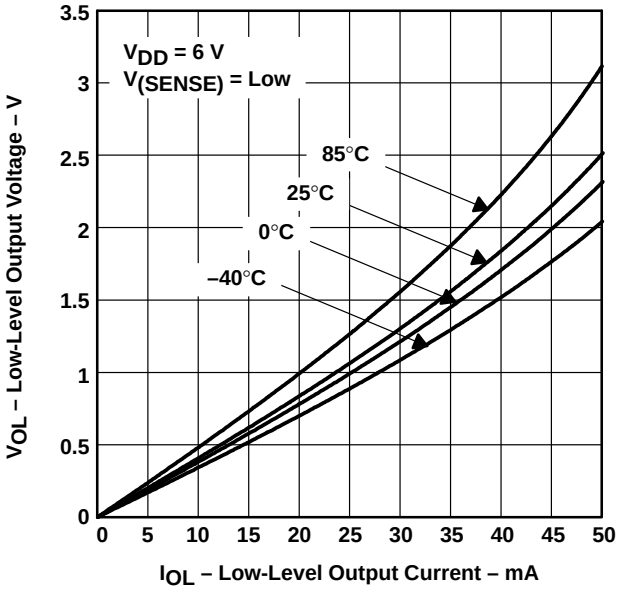



Figure 5

LOW-LEVEL OUTPUT VOLTAGE
vs
LOW-LEVEL OUTPUT CURRENT

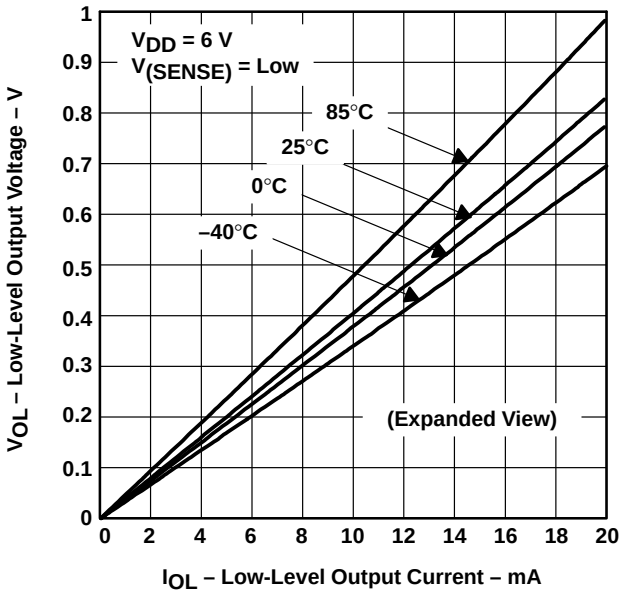



Figure 6

TPS3805H33
HIGH-LEVEL OUTPUT VOLTAGE
vs
HIGH-LEVEL OUTPUT CURRENT

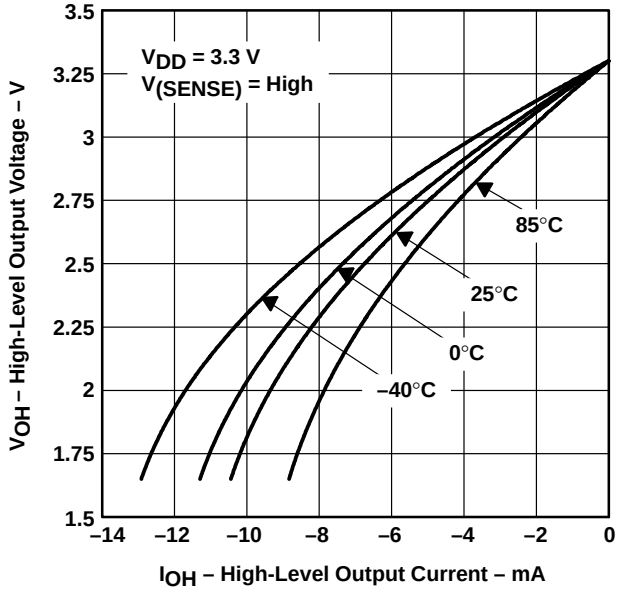



Figure 7

TPS3805H33
HIGH-LEVEL OUTPUT VOLTAGE
vs
HIGH-LEVEL OUTPUT CURRENT

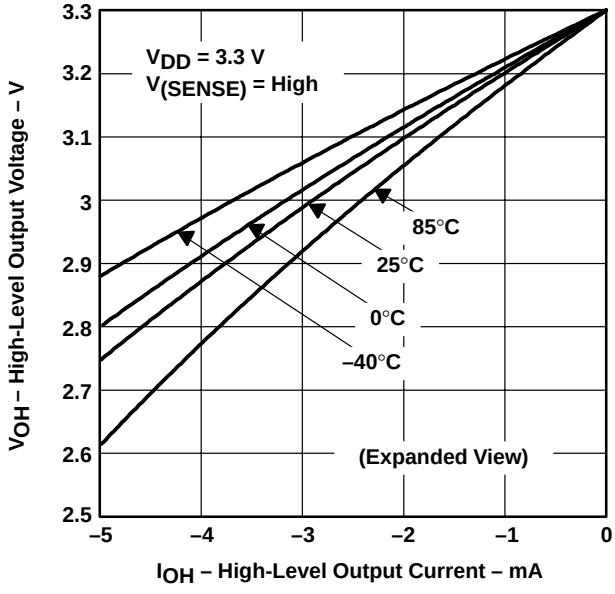



Figure 8

## TYPICAL CHARACTERISTICS

**TPS3805H33
HIGH-LEVEL OUTPUT VOLTAGE
vs
HIGH-LEVEL OUTPUT CURRENT**

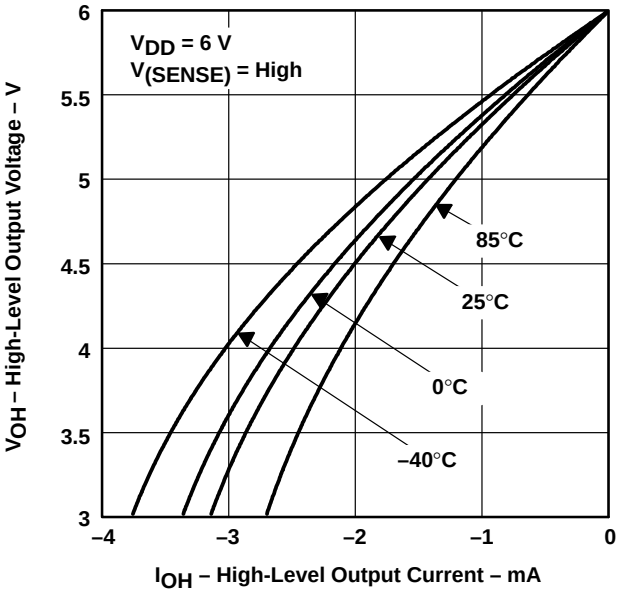



**Figure 9**

**TPS3805H33
HIGH-LEVEL OUTPUT VOLTAGE
vs
HIGH-LEVEL OUTPUT CURRENT**

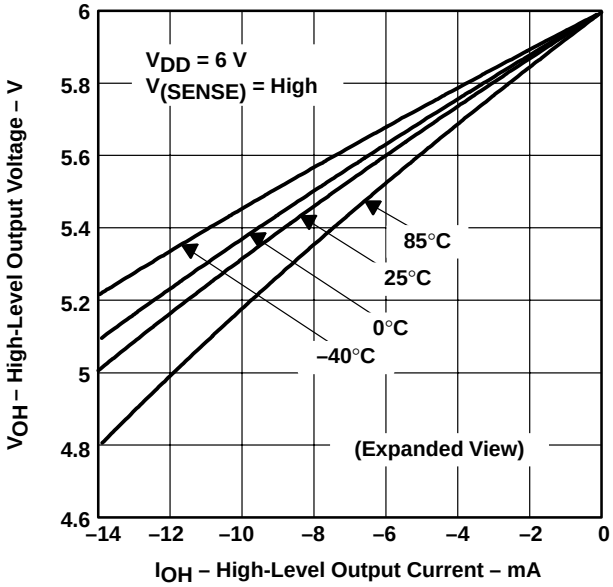



**Figure 10**

**TPS3803–01
NORMALIZED INPUT THRESHOLD VOLTAGE
vs
FREE-AIR TEMPERATURE AT SENSE**

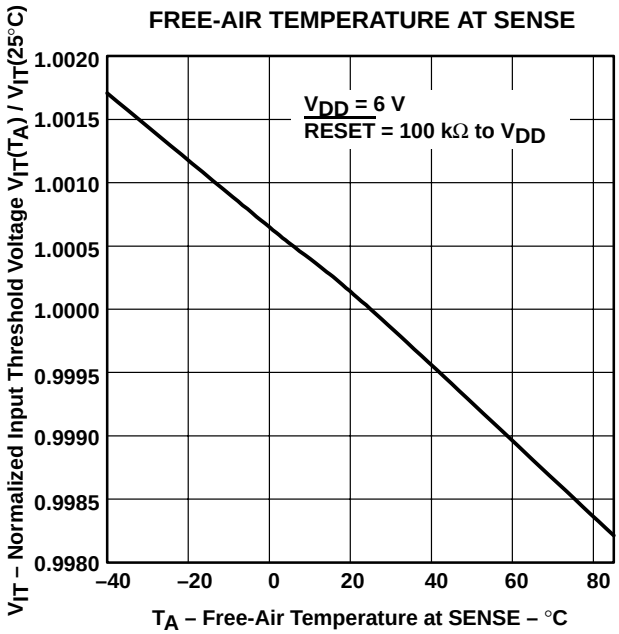



**Figure 11**

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

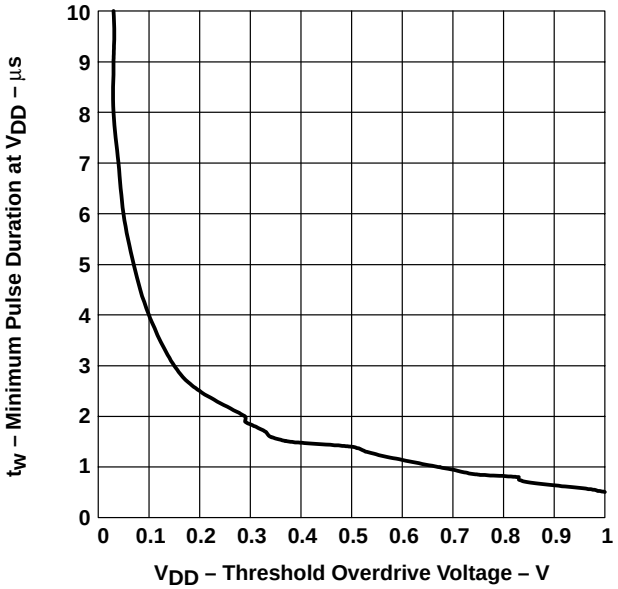



**Figure 12**

## TYPICAL CHARACTERISTICS

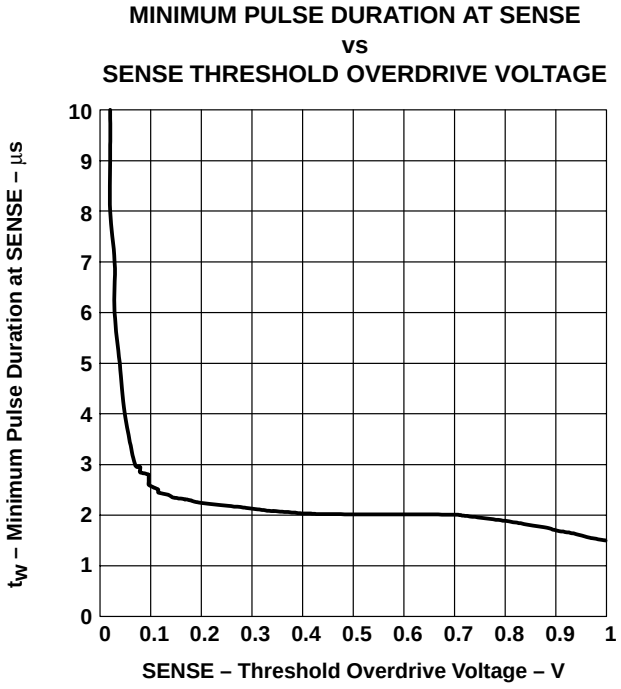
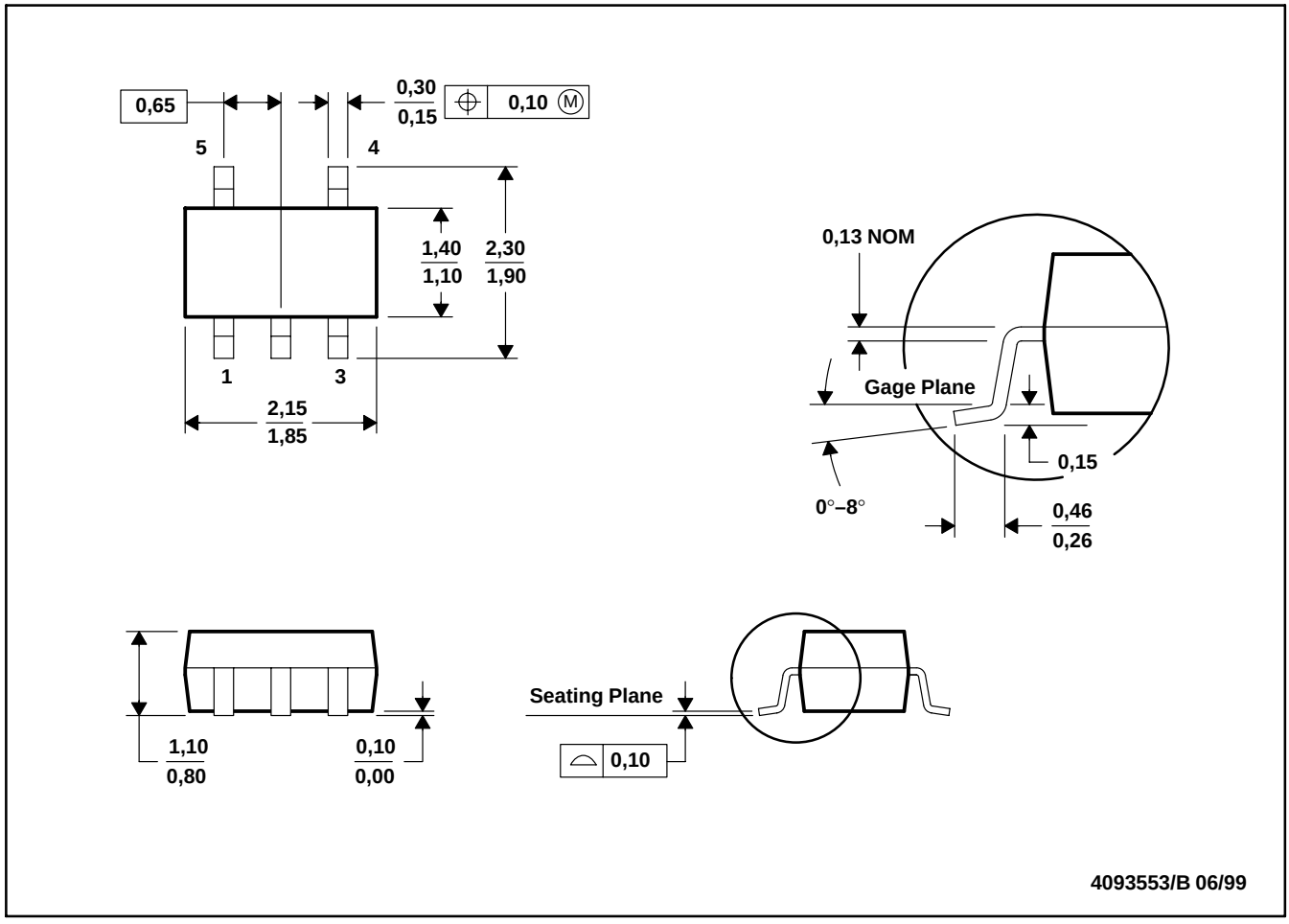



**Figure 13**

## MECHANICAL DATA

**DCK (R-PDSO-G5)** **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.
D. Falls within JEDEC MO-203

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