

# TPS3803-01-EP, TPS3803G15-EP, TPS3805H33-EP VOLTAGE DETECTOR

SGLS227B – DECEMBER 2003 – REVISED DECEMBER 2004

## features

- **Controlled Baseline**
  - One Assembly/Test Site, One Fabrication Site
- **Extended Temperature Performance of Up to  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$**
- **Enhanced Diminishing Manufacturing Sources (DMS) Support**
- **Enhanced Product-Change Notification**
- **Qualification Pedigree†**
- **Single Voltage Detector (TPS3803): Adjustable/1.5 V**

† 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.

## 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. RESET is asserted in case any of the two voltages drops below  $V_{IT}$ .

During power on, 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 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  $V_{IT}$ , 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.

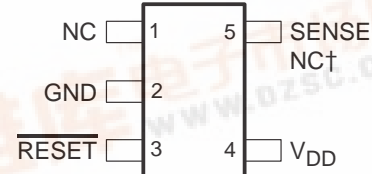
- **Dual Voltage Detector (TPS3805): Adjustable/3.3 V**
- **High  $\pm 1.5\%$  Threshold Voltage Accuracy**
- **Supply Current: 3  $\mu\text{A}$  Typical at  $V_{DD} = 3.3 \text{ V}$**
- **Push/Pull Reset Output (TPS3805) Open-Drain Reset Output (TPS3803)**
- **Five-Pin SC-70 Package**

## 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

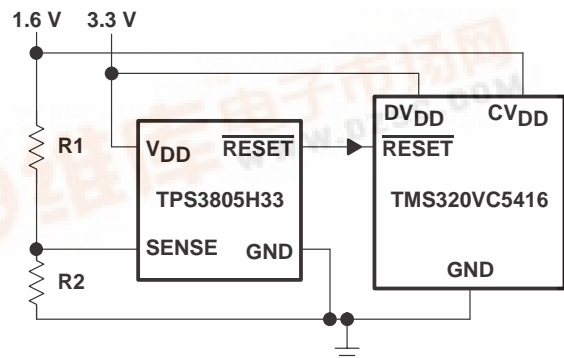
DCK PACKAGE  
(TOP VIEW)

TPS3803-01, TPS3803G15, TPS3805



†TPS3803G15

## typical operating circuit



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# TPS3803-01-EP, TPS3803G15-EP, TPS3805H33-EP

## VOLTAGE DETECTOR

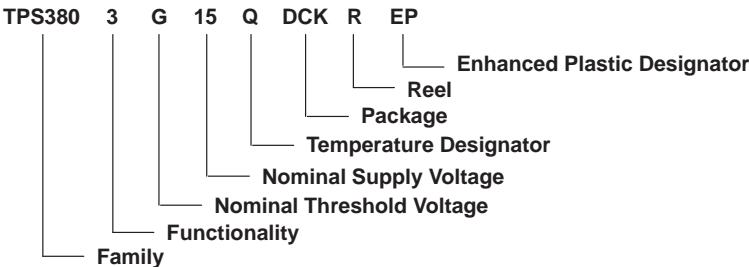
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### PACKAGE INFORMATION

T <sub>A</sub>	DEVICE NAME	THRESHOLD VOLTAGE		MARKING
		V <sub>DD</sub>	SENSE	
–40°C to 125°C	TPS3803–01QDCKREP†	NA	1.226 V	AWH
	TPS3803G15QDCKREP†	1.4 V	NA	AXT
	TPS3805H33QDCKREP†	3.05 V	1.226 V	AWY
–55°C to 125°C	TPS3803–01MDCKREP†	NA	1.226 V	BAY
	TPS3803G15MDCKREP†	1.40 V	NA	ARH
	TPS3805H33MDCKREP†	3.05 V	1.226 V	ARJ

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

### ordering information



### Function/Truth Tables

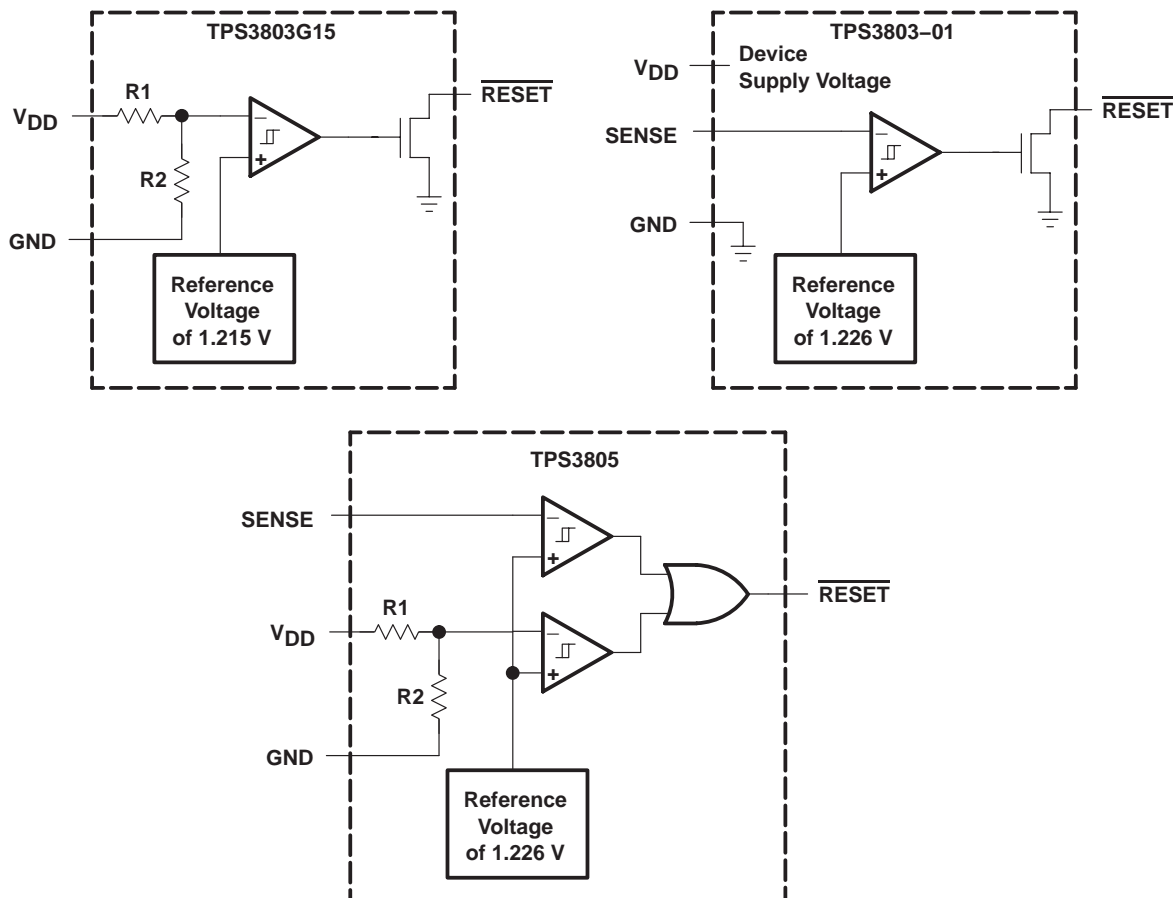
TPS3803-01		TPS3803G15	
SENSE > V <sub>IT</sub>	RESET	V <sub>DD</sub> > V <sub>IT</sub>	RESET
0	L	0	L
1	H	1	H

TPS3805H33		
V <sub>DD</sub> > V <sub>IT</sub>	SENSE > V <sub>IT</sub>	RESET
0	0	L
0	1	L
1	0	L
1	1	H

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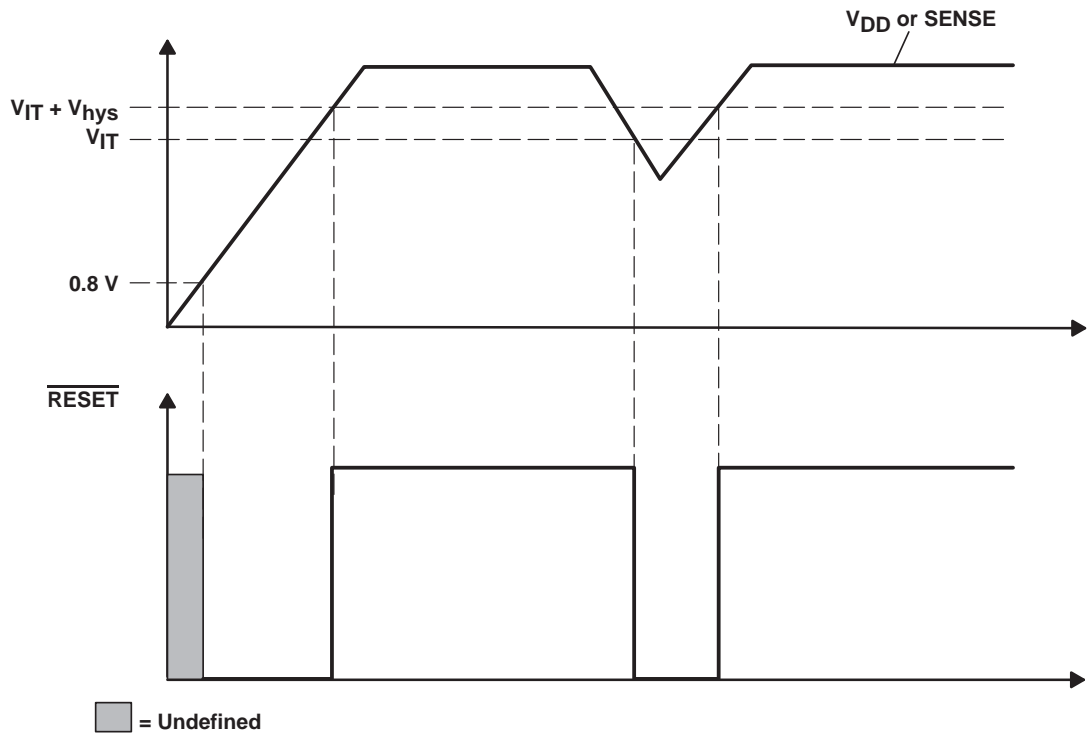
## functional block diagram



TPS3803-01-EP, TPS3803G15-EP, TPS3805H33-EP  
VOLTAGE DETECTOR

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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

# TPS3803-01-EP, TPS3803G15-EP, TPS3805H33-EP VOLTAGE DETECTOR

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## absolute maximum ratings over operating free-air temperature (unless otherwise noted)<sup>†</sup>

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 $V_I > V_{DD}$ )	$\pm 10$ mA
Output clamp current, $I_{OK}$ ( $V_O < 0$ or $V_O > V_{DD}$ )	$\pm 10$ mA
Continuous total power dissipation	See Dissipation Rating Table
Operating free-air temperature range, $T_A$	–55°C to 125°C
Storage temperature range, $T_{stg}$ , (See Note 2)	–65°C to 150°C
Soldering temperature	260°C

<sup>†</sup> 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.

- NOTES: 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.
2. Long term high-temperature storage and/or extended use at maximum recommended operating conditions may result in a reduction of overall device life. See [www.ti.com/ep\\_quality](http://www.ti.com/ep_quality) for additional information on enhanced plastic packaging.

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

		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, $T_A$	Q suffix devices	–40	125	°C
	M suffix devices	–55	125	

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

PARAMETER			TEST CONDITIONS		MIN	TYP	MAX	UNIT	
V <sub>OH</sub>	High-level output voltage (TPS3805 only)		V <sub>DD</sub> = 1.5 V, I <sub>OH</sub> = −0.5 mA		0.8xV <sub>DD</sub>			V	
			V <sub>DD</sub> = 3.3 V, I <sub>OH</sub> = −1 mA						
			V <sub>DD</sub> = 6 V, I <sub>OH</sub> = −1.5 mA						
V <sub>OL</sub>	Low-level output voltage		V <sub>DD</sub> = 1.5 V, I <sub>OL</sub> = 1 mA		0.3			V	
			V <sub>DD</sub> = 3.3 V, I <sub>OL</sub> = 2 mA						
			V <sub>DD</sub> = 6 V, I <sub>OL</sub> = 3 mA						
Power-up reset voltage (see Note 2)			V <sub>IT</sub> > 1.5 V, T <sub>A</sub> = 25°C		0.8			V	
			V <sub>IT</sub> ≤ 1.5 V, T <sub>A</sub> = 25°C		1			V	
V <sub>IT</sub>	Negative-going input threshold voltage (see Note 3)		SENSE		1.2	1.226	1.244	V	
			TPS3803G15		1.379	1.4	1.421		
			TPS3805H33		3.004	3.05	3.096		
V <sub>hys</sub>	Hysteresis		1.2 V < V <sub>IT</sub> < 2.5 V		15			mV	
			2.5 V < V <sub>IT</sub> < 3.5 V		30				
I <sub>I</sub>	Input current	SENSE			−25			25	nA
I <sub>OH</sub>	High-level output current at <u>RESET</u>	Open drain only	V <sub>DD</sub> = V <sub>IT</sub> + 0.2V, V <sub>OH</sub> = V <sub>DD</sub>		300			nA	
I <sub>DD</sub>	Supply current		TPS3803−01	V <sub>DD</sub> = 3.3 V, output unconnected	2			4	μA
			TPS3805, TPS3803G15		3			5	
			TPS3803−01	V <sub>DD</sub> = 6 V, output unconnected	2			4	
			TPS3805, TPS3803G15		4			6	
C <sub>I</sub>	Input capacitance		V <sub>I</sub> = 0 V to V <sub>DD</sub>		1			pF	

NOTES: 3. The lowest supply voltage at which  $\overline{\text{RESET}}$  (VOL(max) = 0.2 V, I<sub>OL</sub> = 50 μA) becomes active. t<sub>r</sub>(V<sub>DD</sub>) ≥ 15 μs/V  
4. 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<sub>L</sub> = 1 MΩ, C<sub>L</sub> = 50 pF, over recommended operating free-air temperature range**

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
t <sub>w</sub>	At V <sub>DD</sub>	V <sub>IH</sub> = 1.05 x V <sub>IT</sub> , V <sub>IL</sub> = 0.95 x V <sub>IT</sub>	5.5			μs
	At SENSE					

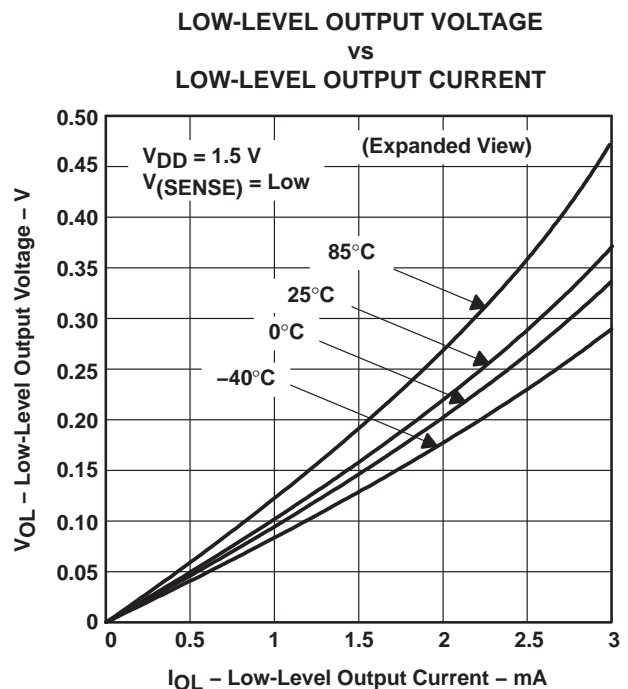
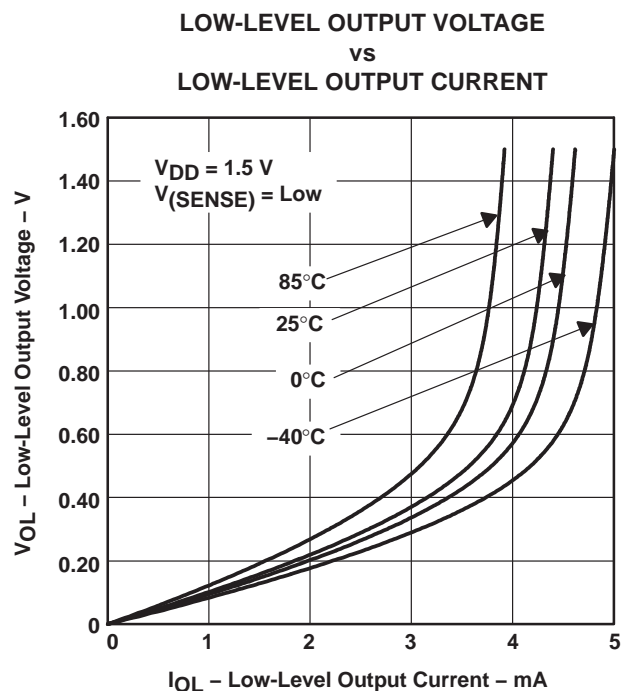
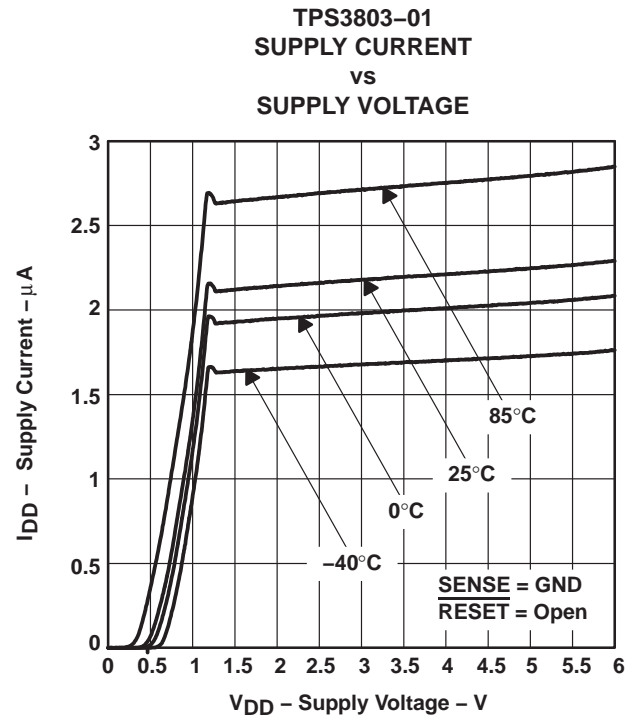
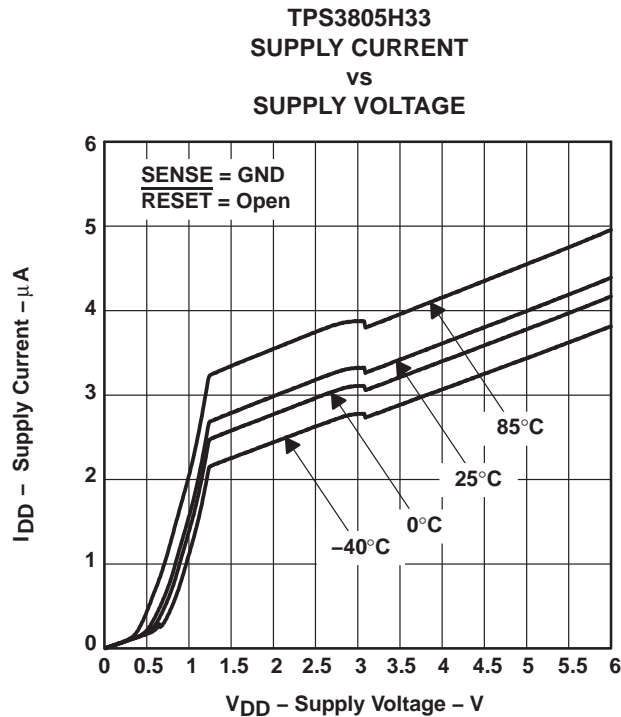
**switching characteristics at R<sub>L</sub> = 1 MΩ, C<sub>L</sub> = 50 pF, over recommended operating free-air temperature range**

PARAMETER			TEST CONDITIONS	MIN	TYP	MAX	UNIT
tPHL	Propagation (delay) time, high-to-low-level output	V <sub>DD</sub> to $\overline{\text{RESET}}$ delay	V <sub>IH</sub> = 1.05 x V <sub>IT</sub> , V <sub>IL</sub> = 0.95 x V <sub>IT</sub>		5	100	μs
		SENSE to $\overline{\text{RESET}}$ delay					
tPLH	Propagation (delay) time, low-to-high-level output	V <sub>DD</sub> to $\overline{\text{RESET}}$ delay					
		SENSE to $\overline{\text{RESET}}$ delay					

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## TYPICAL CHARACTERISTICS



# TPS3803-01-EP, TPS3803G15-EP, TPS3805H33-EP VOLTAGE DETECTOR

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## TYPICAL CHARACTERISTICS

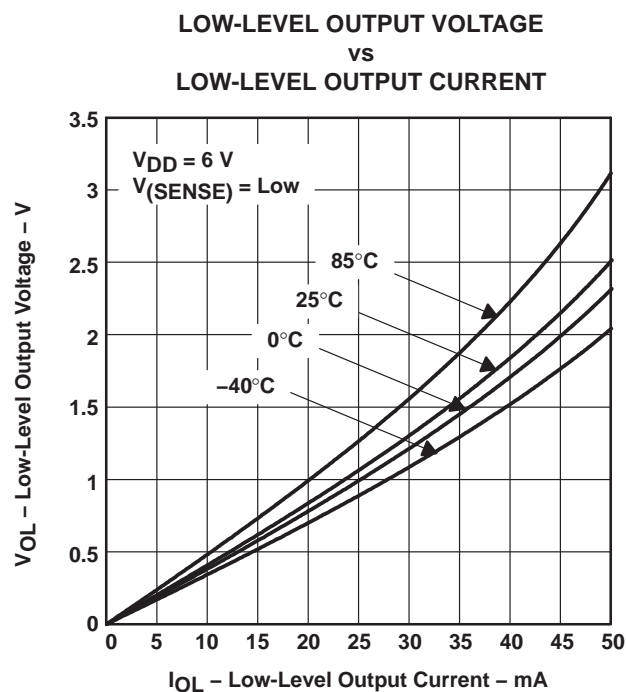


Figure 5

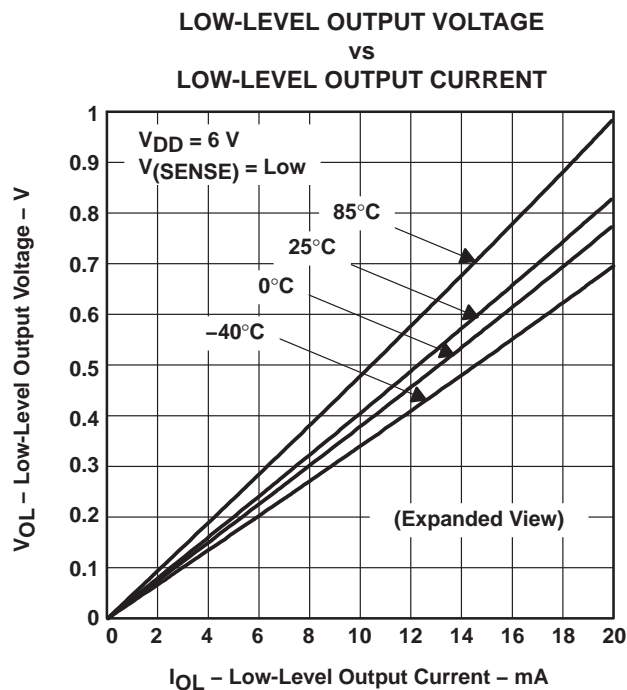


Figure 6

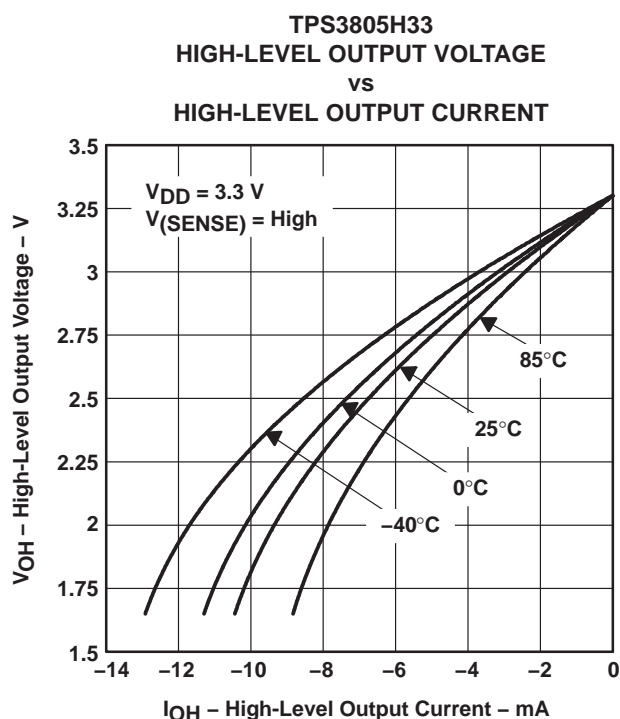


Figure 7

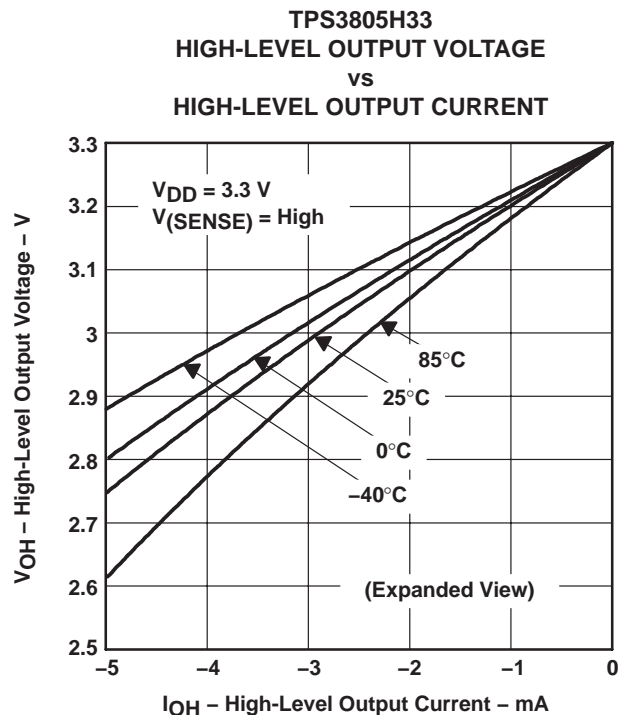


Figure 8



# TPS3803-01-EP, TPS3803G15-EP, TPS3805H33-EP VOLTAGE DETECTOR

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## TYPICAL CHARACTERISTICS

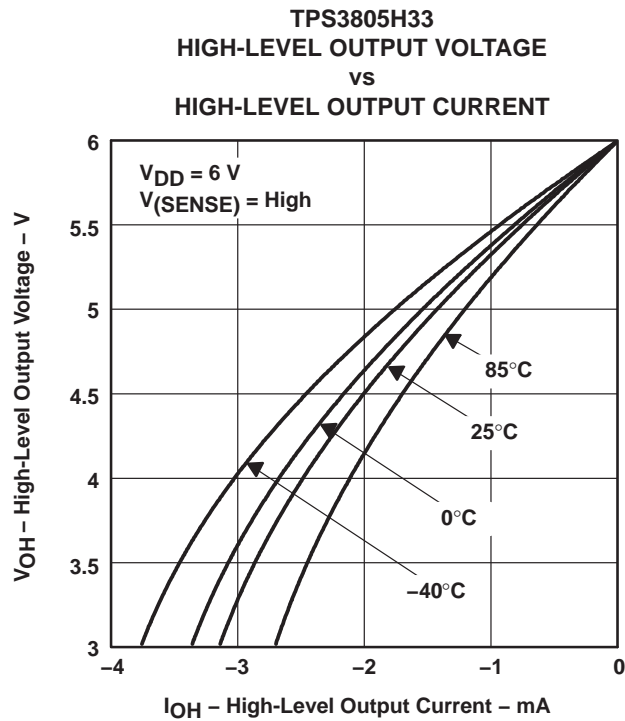


Figure 9

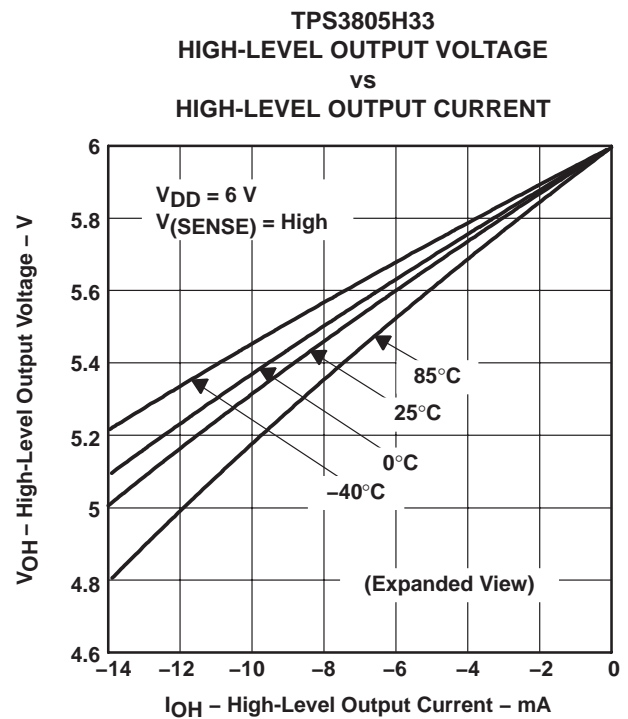


Figure 10

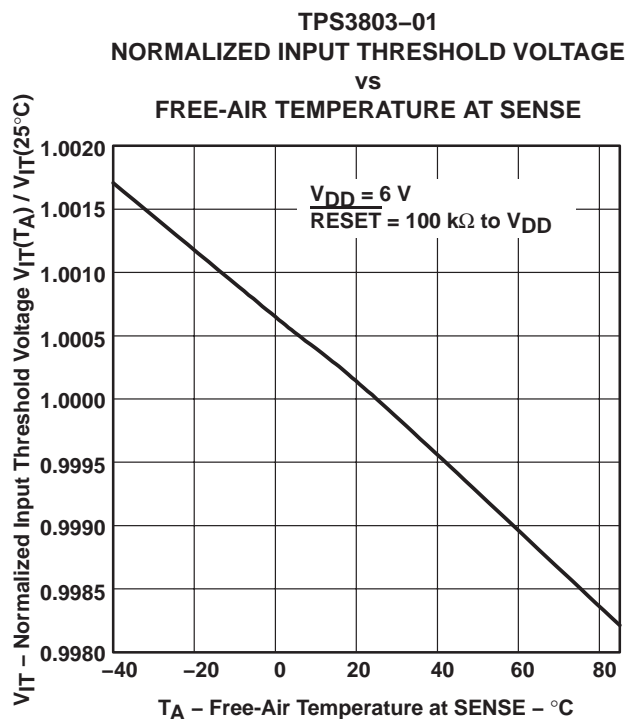


Figure 11

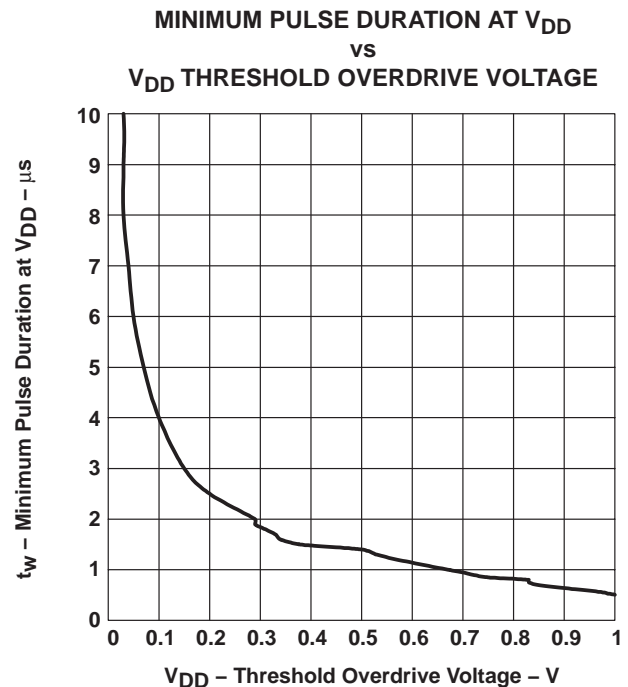


Figure 12

TPS3803-01-EP, TPS3803G15-EP, TPS3805H33-EP  
VOLTAGE DETECTOR

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TYPICAL CHARACTERISTICS

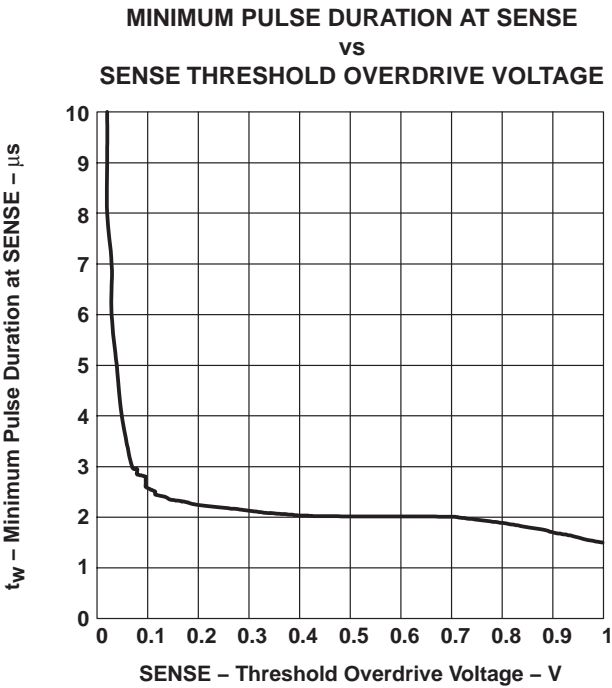


Figure 13

## PACKAGING INFORMATION

Orderable Device	Status <sup>(1)</sup>	Package Type	Package Drawing	Pins	Package Qty	Eco Plan <sup>(2)</sup>	Lead/Ball Finish	MSL Peak Temp <sup>(3)</sup>
TPS3803-01MDCKREP	ACTIVE	SC70	DCK	5	3000	None	CU SNPB	Level-1-220C-UNLIM
TPS3803-01QDCKREP	ACTIVE	SC70	DCK	5	3000	None	CU SNPB	Level-1-220C-UNLIM
TPS3803G15MDCKREP	ACTIVE	SC70	DCK	5	3000	None	CU SNPB	Level-1-220C-UNLIM
TPS3803G15QDCKREP	ACTIVE	SC70	DCK	5	3000	None	CU SNPB	Level-1-220C-UNLIM
TPS3805H33MDCKREP	ACTIVE	SC70	DCK	5	3000	None	CU SNPB	Level-1-220C-UNLIM
V62/04648-01XE	ACTIVE	SC70	DCK	5	3000	None	CU SNPB	Level-1-220C-UNLIM
V62/04648-02XE	ACTIVE	SC70	DCK	5	3000	None	CU SNPB	Level-1-220C-UNLIM
V62/04648-04XE	ACTIVE	SC70	DCK	5	3000	None	CU SNPB	Level-1-220C-UNLIM
V62/04648-05XE	ACTIVE	SC70	DCK	5	3000	None	CU SNPB	Level-1-220C-UNLIM
V62/04648-06XE	ACTIVE	SC70	DCK	5	3000	None	CU SNPB	Level-1-220C-UNLIM

<sup>(1)</sup> 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.

**OBSOLETE:** TI has discontinued the production of the device.

<sup>(2)</sup> 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).

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

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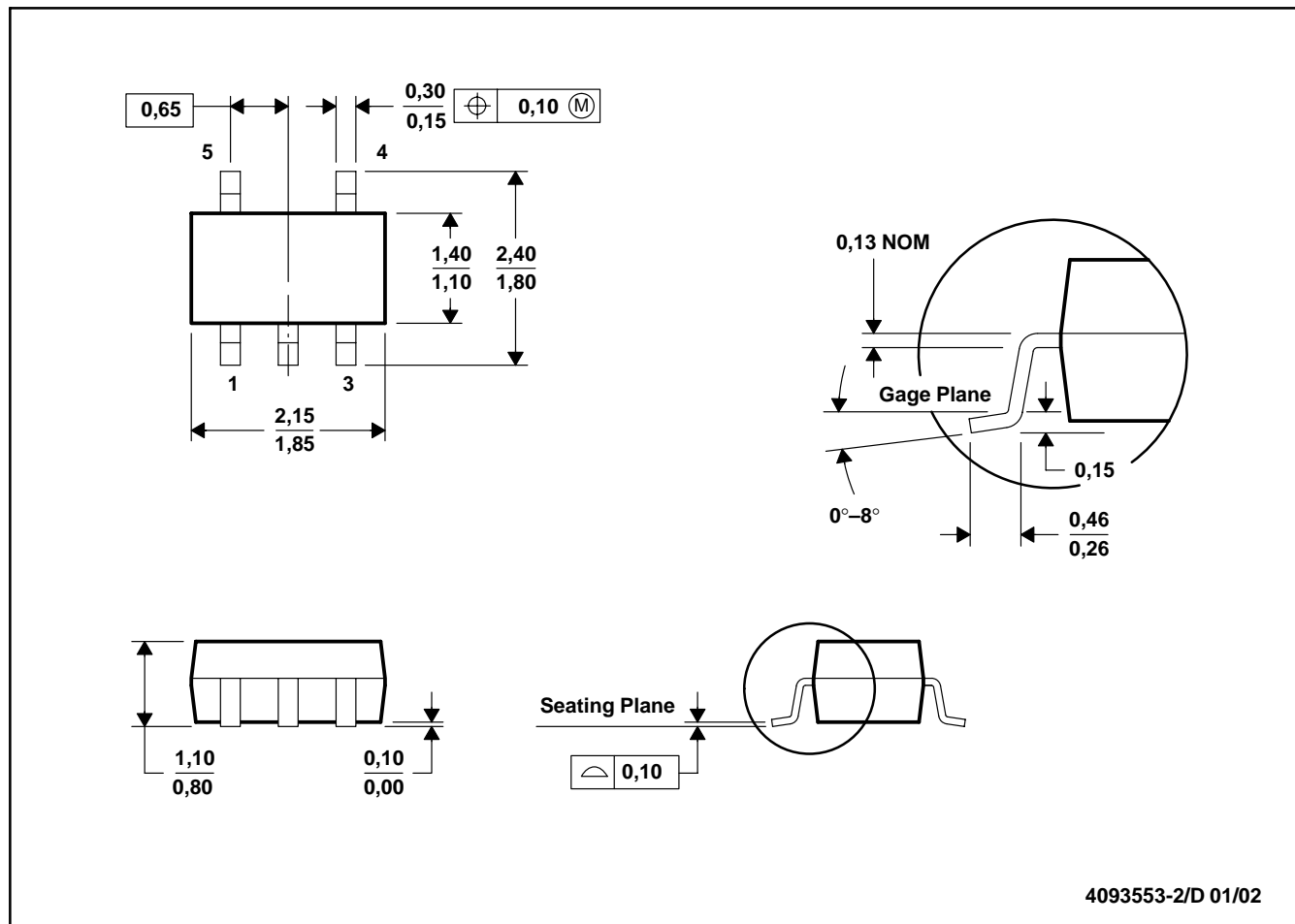
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# MECHANICAL DATA

MPDS025C – FEBRUARY 1997 – REVISED FEBRUARY 2002

DCK (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-203

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Telephony	<a href="http://www.ti.com/telephony">www.ti.com/telephony</a>
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