



## ULTRA-LOW VOLTAGE PROCESSOR SUPERVISORY CIRCUITS

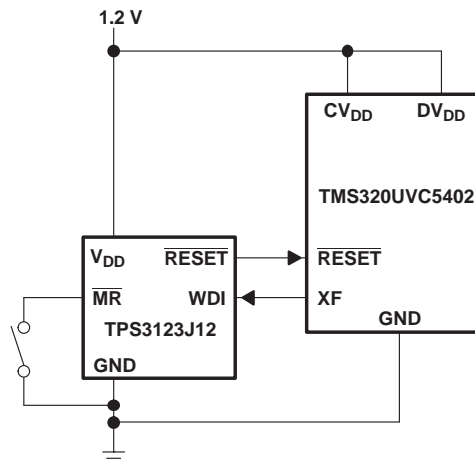
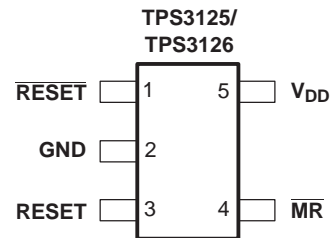
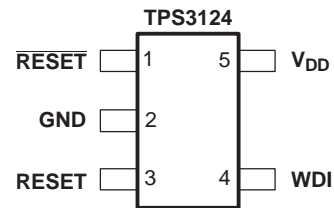
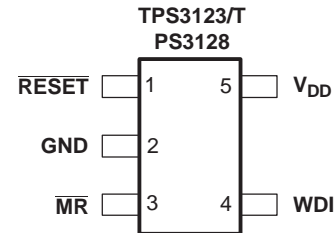
 Check for Samples: [TPS3123-xx](#), [TPS3124-xx](#), [TPS3125-xx](#), [TPS3126-xx](#), [TPS3128-xx](#)

### FEATURES

- Minimum Supply Voltage of 0.75 V
- Supply Voltage Supervision Range:
  - 1.2 V, 1.5 V, 1.8 V (TPS312x)
  - 3 V (TPS3125 Devices Only)
  - Other Versions on Request
- Power-On Reset Generator With Fixed Delay Time of 180 ms
- Manual Reset Input (TPS3123/5/6/8)
- Watchdog Timer Retriggeres the  $\overline{\text{RESET}}$  Output at  $V_{\text{DD}} \geq V_{\text{IT}}$
- Supply Current of 14  $\mu\text{A}$  (Typ)
- Small SOT23-5 Package
- Temperature Range of  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
- Reset Output Available in Push-Pull (Active Low and High) and Open-Drain (Active-Low)

### APPLICATIONS

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

**DBV PACKAGE  
(TOP VIEW)**

**Figure 1. Typical Low-Voltage DSP 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.

All trademarks are the property of their respective owners.

## DESCRIPTION

The TPS312x family of ultralow voltage processor supervisory circuits provides circuit initialization and timing supervision, primarily for DSP and processor-based systems.

During power-on,  $\overline{\text{RESET}}$  is asserted when the supply voltage ( $V_{\text{DD}}$ ) becomes higher than 0.75 V. Thereafter, the supply voltage supervisor monitors  $V_{\text{DD}}$  and keeps  $\overline{\text{RESET}}$  output active as long as  $V_{\text{DD}}$  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,  $t_d = 180$  ms, starts after  $V_{\text{DD}}$  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 a high precision internal voltage divider.

The TPS3123/5/6/8 devices incorporate a manual reset input,  $\overline{\text{MR}}$ . A low level at  $\overline{\text{MR}}$  causes  $\overline{\text{RESET}}$  to become active. The TPS3124 devices do not have the input MR, but include a high-level output RESET same as the TPS3125 and TPS3126 devices. In addition, the TPS3123/4/8 have a watchdog timer that needs to be triggered periodically by a positive or negative transition at  $\overline{\text{WDI}}$ . When the supervising system fails to retrigger the watchdog circuit within the time-out interval  $t_{\text{out}} = 0.8$  s,  $\overline{\text{RESET}}$  output becomes active for the time period ( $t_d$ ). This event also reinitializes the watchdog timer.

The circuits are available in a 5-pin SOT23-5 package. The TPS312x devices are characterized for operation over a temperature range of  $-40^\circ\text{C}$  to  $+85^\circ\text{C}$ .

**Table 1. PACKAGE INFORMATION, STANDARD VERSIONS<sup>(1)(2)</sup>**

$T_A$	DEVICE NAME		THRESHOLD VOLTAGE	MARKING
-40°C to +85°C	TPS3123J12DBVR <sup>(3)</sup>	TPS3123J12DBVT <sup>(4)</sup>	1.08 V	PBNI
	TPS3123G15DBVR <sup>(3)</sup>	TPS3123G15DBVT <sup>(4)</sup>	1.40 V	PBOI
	TPS3123J18DBVR <sup>(3)</sup>	TPS3123J18DBVT <sup>(4)</sup>	1.62 V	PBPI
	TPS3124J12DBVR <sup>(3)</sup>	TPS3124J12DBVT <sup>(4)</sup>	1.08 V	PBQI
	TPS3124G15DBVR <sup>(3)</sup>	TPS3124G15DBVT <sup>(4)</sup>	1.40 V	PBRI
	TPS3124J18DBVR <sup>(3)</sup>	TPS3124J18DBVT <sup>(4)</sup>	1.62 V	PBSI
	TPS3125J12DBVR <sup>(3)</sup>	TPS3125J12DBVT <sup>(4)</sup>	1.08 V	PBTI
	TPS3125G15DBVR <sup>(3)</sup>	TPS3125G15DBVT <sup>(4)</sup>	1.40 V	PBUI
	TPS3125J18DBVR <sup>(3)</sup>	TPS3125J18DBVT <sup>(4)</sup>	1.62 V	PBVI
	TPS3125L30DBVR <sup>(3)</sup>	TPS3125L30DBVT <sup>(4)</sup>	2.64 V	PBXI
	TPS3126E12DBVR <sup>(3)</sup>	TPS3126E12DBVT <sup>(4)</sup>	1.14 V	PFOI
	TPS3126E15DBVR <sup>(3)</sup>	TPS3126E15DBVT <sup>(4)</sup>	1.43 V	PFPI
	TPS3126E18DBVR <sup>(3)</sup>	TPS3126E18DBVT <sup>(4)</sup>	1.71 V	PFQI
	TPS3128E15DBVR <sup>(3)</sup>	TPS3128E15DBVT <sup>(4)</sup>	1.43 V	PFSI
TPS3128E18DBVR <sup>(3)</sup>	TPS3128E18DBVT <sup>(4)</sup>	1.71 V	PFTI	

(1) Other versions available. Contact Texas Instruments for details; minimum order quantities apply.

(2) For the most current package and ordering information see the Package Option Addendum at the end of this document, or visit the device product folder at [www.ti.com](http://www.ti.com).

(3) The DBVR passive indicates tape and reel of 3000 parts.

(4) The DBVT passive indicates tape and reel of 250 parts.

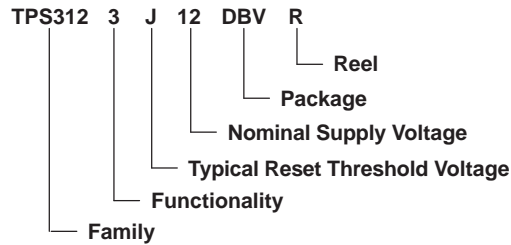


Table 2. Ordering Information Application Specific Versions <sup>(1)</sup>

DEVICE NAME	NOMINAL SUPPLY VOLTAGE, $V_{NOM}$	DEVICE NAME	TYPICAL RESET THRESHOLD VOLTAGE- $V_{IT-}$
TPS312xx12DBV	1.2 V	TPS312xAxxDBV	$V_{NOM} -1\%$
TPS312xx15DBV	1.5 V	TPS312xBxxDBV	$V_{NOM} -2\%$
TPS312xx18DBV	1.8 V	TPS312xCxxDBV	$V_{NOM} -3\%$
TPS312xx30DBV	3.0 V	TPS312xDxxDBV	$V_{NOM} -4\%$
		TPS312xExxDBV	$V_{NOM} -5\%$
		TPS312xFxxDBV	$V_{NOM} -6\%$
		TPS312xGxxDBV	$V_{NOM} -7\%$
		TPS312xHxxDBV	$V_{NOM} -8\%$
		TPS312xIxxDBV	$V_{NOM} -9\%$
		TPS312xJxxDBV	$V_{NOM} -10\%$
		TPS312xKxxDBV	$V_{NOM} -11\%$
		TPS312xLxxDBV	$V_{NOM} -12\%$
		TPS312xMxxDBV	$V_{NOM} -13\%$
		TPS312xNxxDBV	$V_{NOM} -14\%$
		TPS312xOxxDBV	$V_{NOM} -15\%$

(1) For the application-specific versions contact Texas Instruments for availability, lead time, and minimum order quantities.

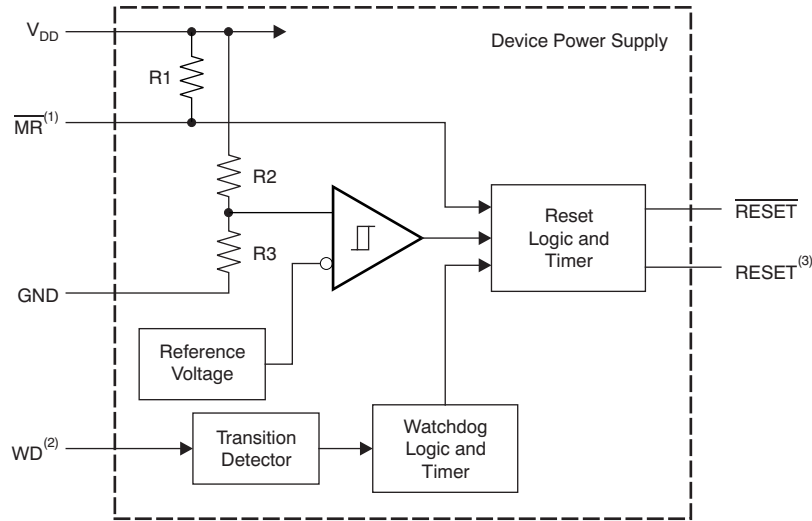
Table 3. Function Tables

TPS3123/8			TPS3124			TPS3125/6			
$\overline{MR}$	$V_{DD} > V_{IT}$	$\overline{RESET}$	$V_{DD} > V_{IT}$	$\overline{RESET}$	RESET	$\overline{MR}$	$V_{DD} > V_{IT}$	$\overline{RESET}$	RESET
L	0	L	0	L	H	L	0	L	H
L	1	L	1	H	L	L	1	L	H
H	0	L				H	0	L	H
H	1	H				H	1	H	L

Table 4. Reset Topology

DEVICES	OPEN DRAIN	PUSH-PULL
TPS3123		X
TPS3124		X
TPS3125		X
TPS3126	X	
TPS3128	X	

**Figure 2. FUNCTIONAL BLOCK DIAGRAM**



- NOTES:  
 (1) TPS3123/5/6/8  
 (2) TPS3123/4/8  
 (3) TPS3124/5/6

**Figure 3. TIMING DIAGRAM TPS3123/5/6/8**

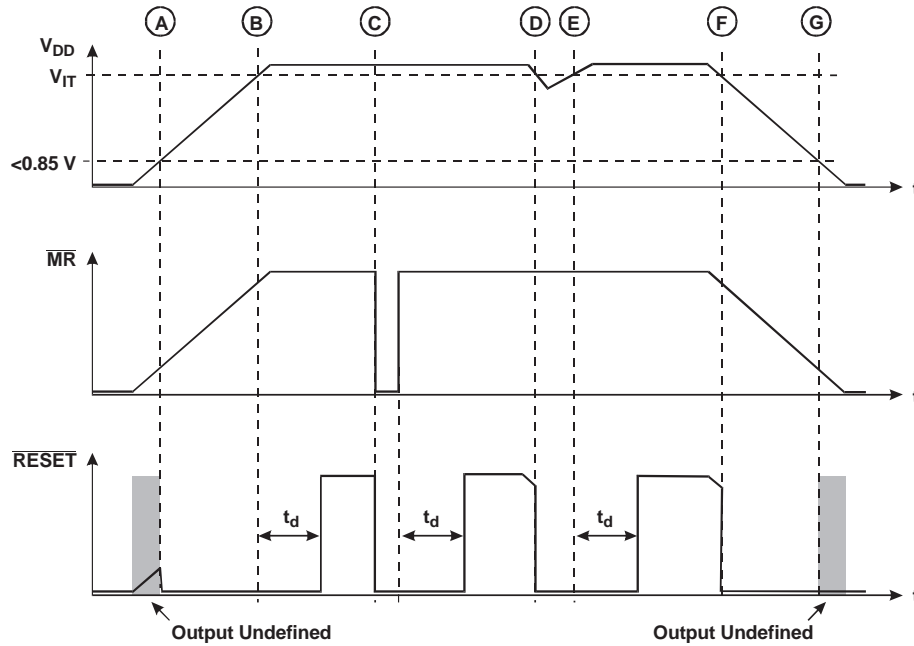
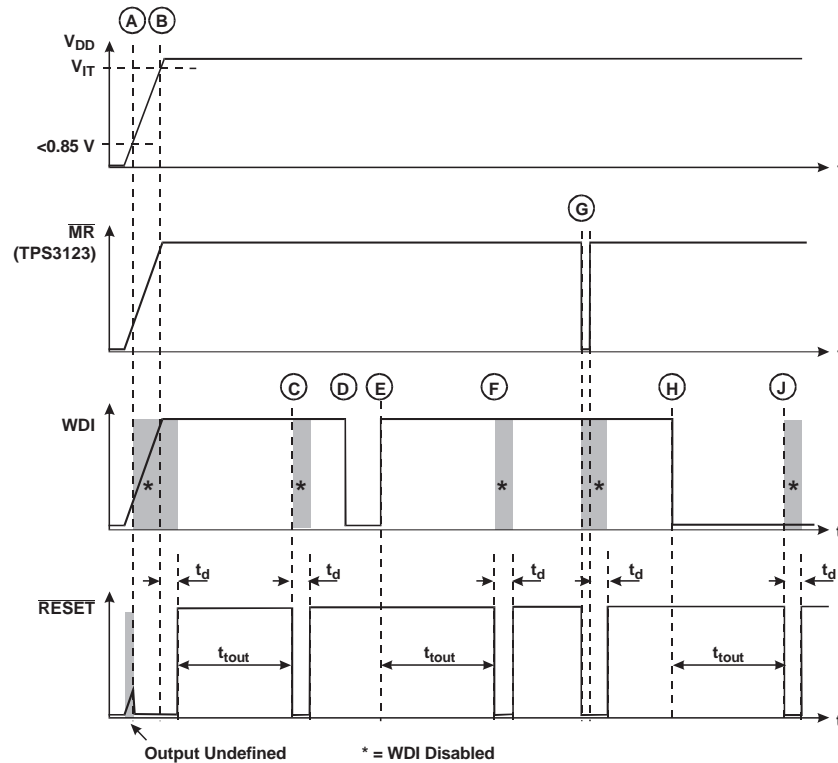


Figure 4. TIMING DIAGRAM TPS3123/4//8



## ABSOLUTE MAXIMUM RATINGS

over operating free-air temperature range (unless otherwise noted)<sup>(1)</sup>

	UNIT
Manual reset, $\overline{\text{MR}}$	-0.3 V to $V_{DD} + 0.6\text{ V}$
$\overline{\text{RESET}}$	-0.3 V to $V_{DD} + 0.6\text{ V}$
$V_{DD}$ Supply voltage	3.6 V
WDI Watchdog input	-0.3 V to $V_{DD} + 0.6\text{ V}$
$I_{OL}$ Maximum low output current	5 mA
$I_{OH}$ Maximum high output current	-5 mA
$I_{IK}$ Input clamp current ( $V_I < 0$ or $V_I > V_{DD}$ )	$\pm 10\text{ mA}$
$I_{OK}$ Output clamp current ( $V_O < 0$ or $V_O > V_{DD}$ )	$\pm 10\text{ mA}$
Continuous total power dissipation	See <a href="#">Dissipation Rating Table</a>
$T_A$ Operating free-air temperature range,	-40°C to +85°C
$T_{stg}$ Storage temperature range,	-65°C to +150°C
Soldering temperature	+260°C
Open drain RESET outputs	-0.3 V to $V_{DD} + 0.3\text{ V}$

(1) 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.

## DISSIPATION RATING TABLE

PACKAGE	$T_A \leq +25^\circ\text{C}$ 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
DBV	437 mW	3.5 mW/°C	280 mW	227 mW

## RECOMMENDED OPERATING CONDITIONS

at specified temperature range.

		MIN	MAX	UNIT
V <sub>DD</sub>	Supply voltage	T <sub>A</sub> = 0°C to +85°C		V
		T <sub>A</sub> = -40°C to +85°C		
V <sub>DD</sub>	Manual reset voltage	0.0	V <sub>DD</sub> + 0.3	V
V <sub>WD1</sub>	Watchdog input voltage	0	V <sub>DD</sub> + 0.3	V
V <sub>IH</sub>	High-level input voltage	0.7 × V <sub>DD</sub>		V
V <sub>IL</sub>	Low-level input voltage	0.3 × V <sub>DD</sub>		V
Δ t/Δ V	Input transition rise and fall rate at WDI	1		μs/V
T <sub>A</sub>	Operating free-air temperature range	40	+85	°C

## ELECTRICAL CHARACTERISTICS

over recommended operating free-air temperature range (unless otherwise noted).

PARAMETER		TEST CONDITIONS		MIN	TYP	MAX	UNIT
$\overline{\text{MR}}$ pullup resistor (internal)				27			kΩ
I <sub>IH</sub>	High-level input current	WDI	WDI = V <sub>DD</sub> = 3.3 V	1		1	μA
		$\overline{\text{MR}}$	$\overline{\text{MR}}$ = 0.7 × V <sub>DD</sub> , V <sub>DD</sub> = 3.3 V	20		55	
I <sub>IL</sub>	Low-level input current	WDI	WDI = 0 V, V <sub>DD</sub> = 3.3 V	1		1	μA
		$\overline{\text{MR}}$	$\overline{\text{MR}}$ = 0 V, V <sub>DD</sub> = 3.3 V	80		170	
I <sub>OH</sub>	High-level output current (leakage into $\overline{\text{RESET}}$ pin)	TPS3126-xx, TPS3128-xx	V <sub>DD</sub> = V <sub>OH</sub> = 3.3 V			200	nA
V <sub>OH</sub>	High-level output voltage (TPS3123/4/5 only)	$\overline{\text{RESET}}$	V <sub>DD</sub> = 1.5 V, I <sub>OH</sub> = -1 mA	0.8 × V <sub>DD</sub>			V
			V <sub>DD</sub> = 3.3 V, I <sub>OH</sub> = -4.5 mA				
		RESET	V <sub>DD</sub> = 0.75 V, I <sub>OH</sub> = -8 μA				
			V <sub>DD</sub> = 1.5 V, I <sub>OH</sub> = -1 mA				
V <sub>OL</sub>	Low-level output voltage	$\overline{\text{RESET}}$	V <sub>DD</sub> = 0.75 V, I <sub>OL</sub> = 15 μA	0.2 × V <sub>DD</sub>			V
			V <sub>DD</sub> = 1.5 V, I <sub>OL</sub> = 1.4 mA				
		RESET	V <sub>DD</sub> = 1.5 V, I <sub>OL</sub> = 1.4 mA				
			V <sub>DD</sub> = 3.3 V, I <sub>OL</sub> = 3 mA				
V <sub>IT-</sub>	Negative-going input threshold voltage <sup>(1)</sup>	TPS312xJ12	T <sub>A</sub> = -40°C to +85°C	1.04	1.08	1.12	V
		TPS312xG15		1.35	1.40	1.45	
		TPS312xJ18		1.56	1.62	1.68	
		TPS312xL30		2.57	2.64	2.71	
		TPS312xE12		1.10	1.14	1.18	
		TPS312xE15		1.38	1.43	1.48	
		TPS312xE18		1.65	1.71	1.77	
V <sub>hys</sub>	Hysteresis at V <sub>DD</sub> input	1 V < V <sub>IT-</sub> < 1.4 V		15			mV
		1.4 V < V <sub>IT-</sub> < 2 V		20			
		2 V < V <sub>IT-</sub> < 3 V		30			
I <sub>DD</sub>	Supply current	TPS3123-xx, TPS3124-xx, TPS3128-xx	$\overline{\text{WDI}}$ = V <sub>DD</sub> , $\overline{\text{MR}}$ unconnected	V <sub>DD</sub> = 0.75 V	14		μA
				V <sub>DD</sub> = 3.3 V	22	30	
		TPS3125-xx, TPS3126-xx <sup>(2)</sup>	$\overline{\text{MR}}$ unconnected	V <sub>DD</sub> = 0.75 V	14		
				V <sub>DD</sub> = 3.3 V	18	25	
C <sub>i</sub>	Input capacitance at $\overline{\text{MR}}$ , WDI	V <sub>I</sub> = 0 V to 3.3 V		5			pF

(1) To ensure best stability of the threshold voltage, a bypass capacitor (ceramic, 0.1 μF) should be placed near the supply terminal.

(2) The supply current during delay time t<sub>d</sub> is typical 5 μA higher.

## TIMING REQUIREMENTS

 at  $R_L = 1\text{ M}\Omega$ ,  $C_L = 50\text{ pF}$ ,  $T_A = +25^\circ\text{C}$ .

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
$t_w$	Pulse width	$V_{IH} = V_{IT-} + 0.2\text{ V}$ , $V_{IL} = V_{IT-} - 0.2\text{ V}$ $V_{DD} \geq V_{IT-} + 0.2\text{ V}$ , $V_{IL} = 0.3 \times V_{DD}$ , $V_{IH} = 0.7 \times V_{DD}$	6			$\mu\text{s}$
	At $V_{DD}$		1			
	At $\overline{\text{MR}}$		0.1			

## SWITCHING CHARACTERISTICS

 at  $R_L = 1\text{ M}\Omega$ ,  $C_L = 50\text{ pF}$ ,  $T_A = +25^\circ\text{C}$ .

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
$t_{\text{tout}}$	Watchdog time out	$V_{DD} \geq V_{IT-} + 0.2\text{ V}$ , See timing diagram	0.8	1.4	2.1	s
$t_d$	Delay time	$V_{DD} > V_{IT-} + 0.2\text{ V}$ , See timing diagram	100	180	260	ms
$t_{\text{PHL}}$	Propagation delay time, high-to-low-level output	$\overline{\text{MR}}$ to $\overline{\text{RESET}}$ delay (TPS3123/5/6/8)			0.1	$\mu\text{s}$
$t_{\text{PLH}}$	Propagation delay time, low-to-high-level output	$\overline{\text{MR}}$ to $\overline{\text{RESET}}$ delay (TPS3125/6)			0.1	
$t_{\text{PHL}}$	Propagation delay time, high-to-low-level output	$V_{DD}$ to $\overline{\text{RESET}}$ delay			10	$\mu\text{s}$
$t_{\text{PLH}}$	Propagation delay time, low-to-high-level output	$V_{DD}$ to $\overline{\text{RESET}}$ delay (TPS3124/5/6)			10	

TYPICAL CHARACTERISTICS

SUPPLY CURRENT  
 vs  
 SUPPLY VOLTAGE

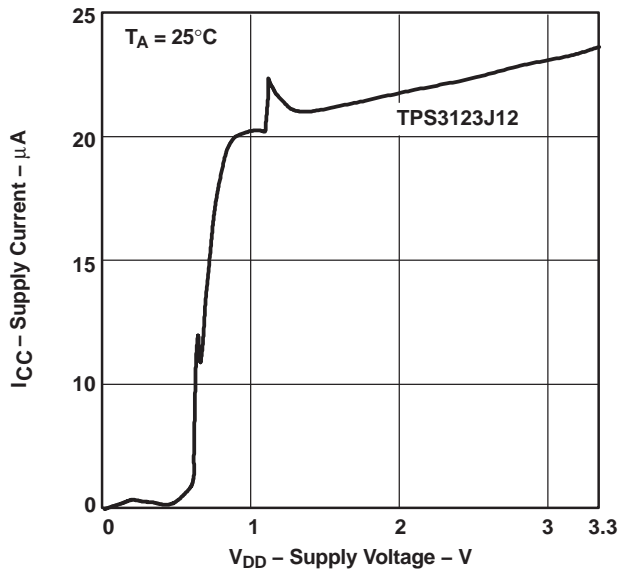


Figure 5.

LOW-LEVEL OUTPUT VOLTAGE  
 vs  
 LOW-LEVEL OUTPUT CURRENT

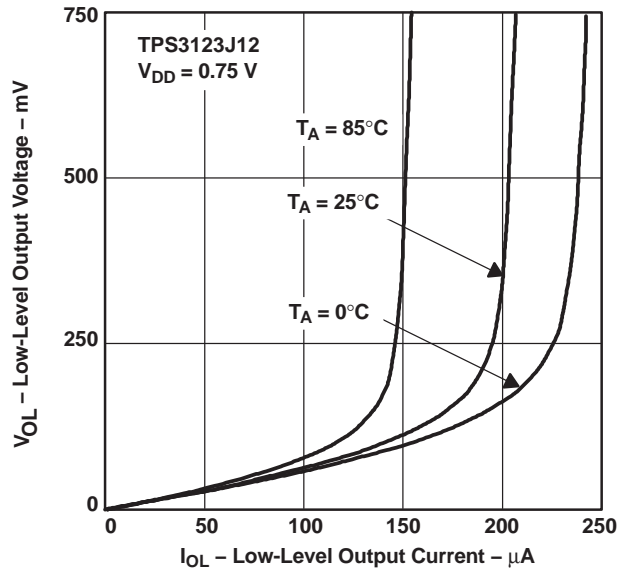


Figure 6.

LOW-LEVEL OUTPUT VOLTAGE  
 vs  
 LOW-LEVEL OUTPUT CURRENT

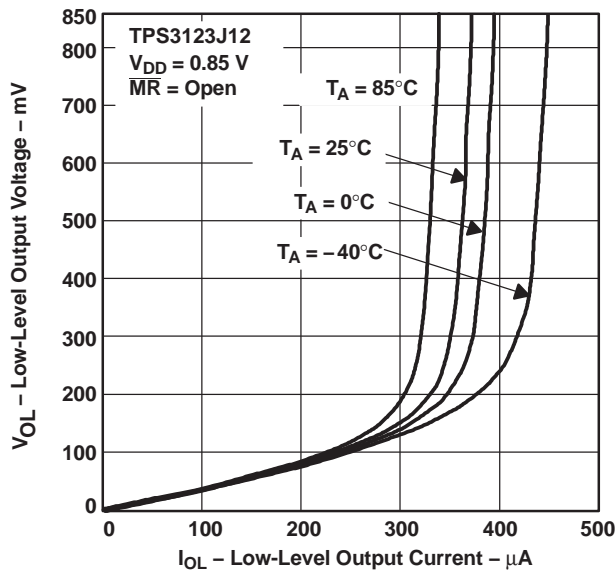


Figure 7.

LOW-LEVEL OUTPUT VOLTAGE  
 vs  
 LOW-LEVEL OUTPUT CURRENT

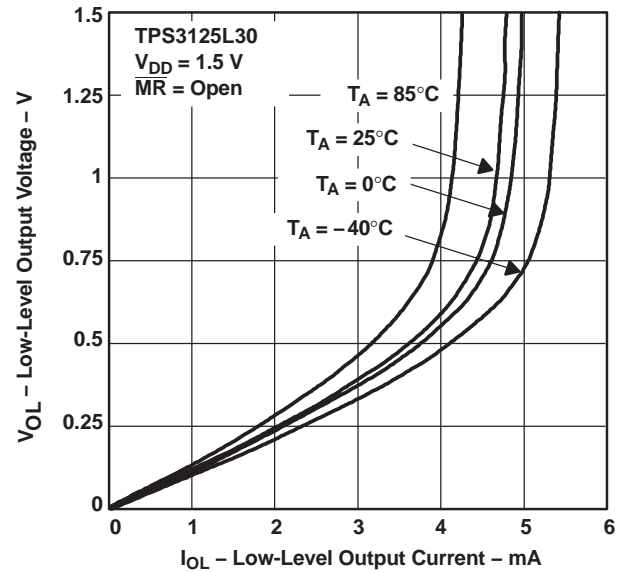


Figure 8.



TYPICAL CHARACTERISTICS (continued)

LOW-LEVEL OUTPUT VOLTAGE  
 vs  
 LOW-LEVEL OUTPUT CURRENT

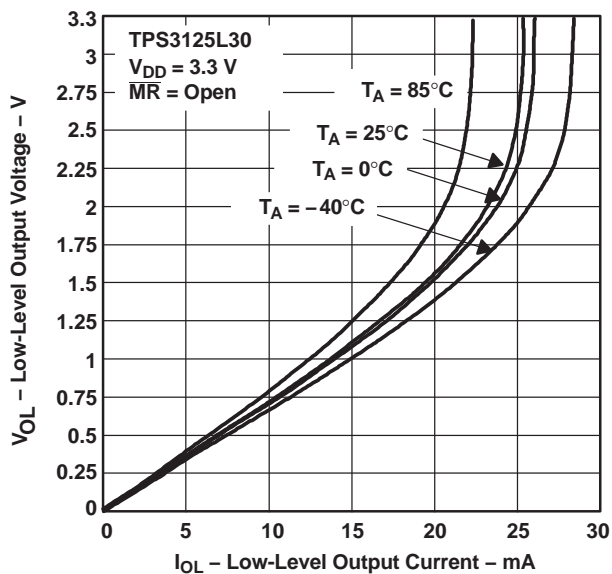


Figure 9.

HIGH-LEVEL OUTPUT VOLTAGE  
 vs  
 HIGH-LEVEL OUTPUT CURRENT

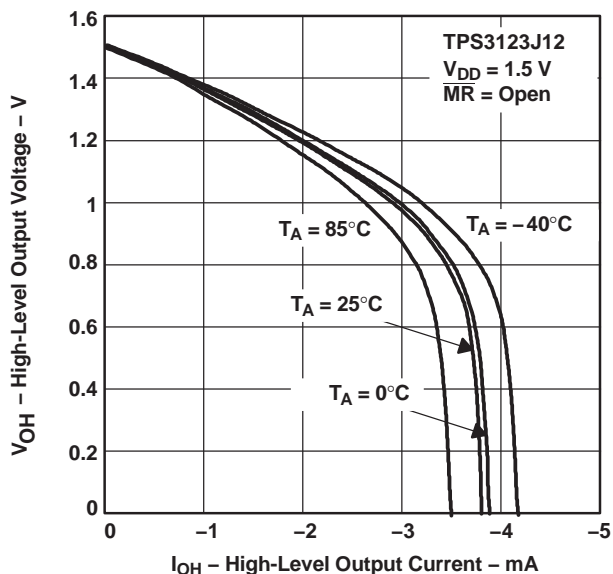


Figure 10.

HIGH-LEVEL OUTPUT VOLTAGE  
 vs  
 HIGH-LEVEL OUTPUT CURRENT

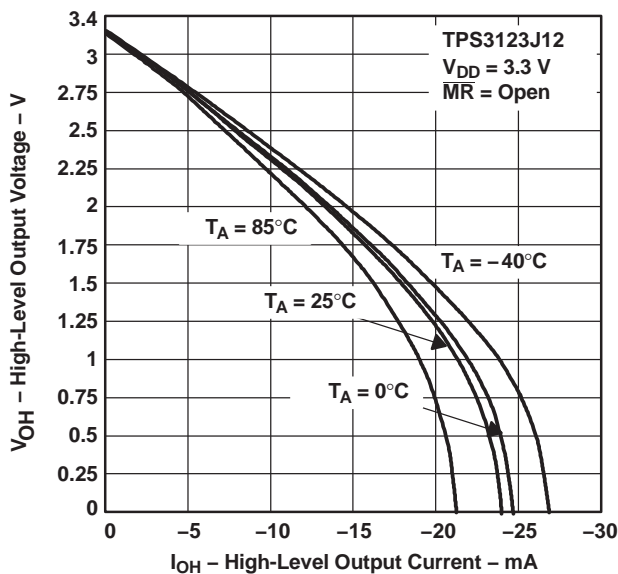


Figure 11.

NORMALIZED INPUT THRESHOLD VOLTAGE  
 vs  
 FREE-AIR TEMPERATURE

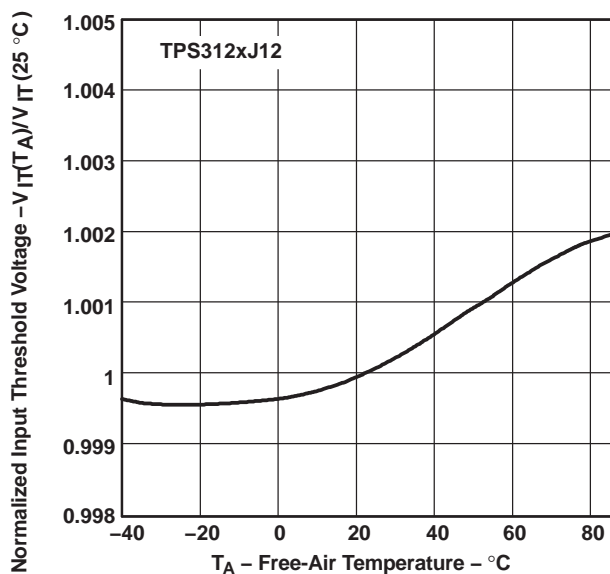


Figure 12.

**TYPICAL CHARACTERISTICS (continued)**

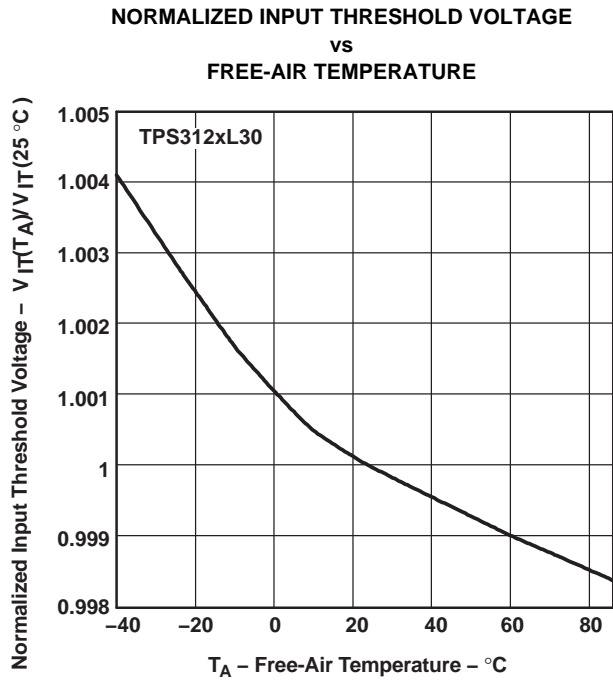


Figure 13.

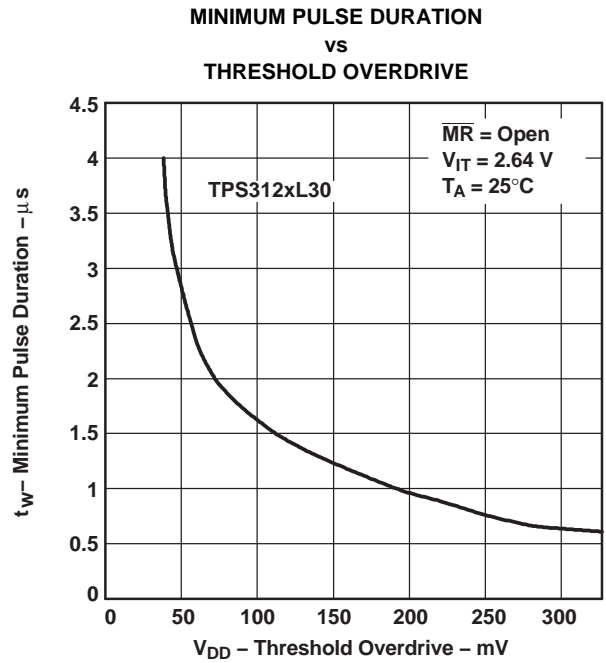


Figure 14.

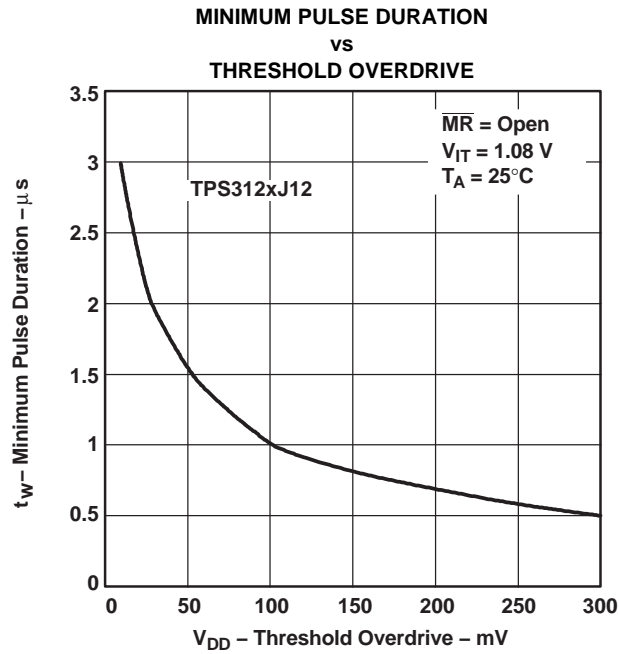


Figure 15.

## REVISION HISTORY

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

Changes from Revision D (December, 2006) to Revision E	Page
• Removed <i>TPS3128E12DBVR</i> from list of orderable devices in <a href="#">Table 1</a> .....	2

**PACKAGING INFORMATION**

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
TPS3123J12DBVR	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	PBNI	<a href="#">Samples</a>
TPS3123J12DBVT	ACTIVE	SOT-23	DBV	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	PBNI	<a href="#">Samples</a>
TPS3123J18DBVR	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	PBPI	<a href="#">Samples</a>
TPS3123J18DBVT	ACTIVE	SOT-23	DBV	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	PBPI	<a href="#">Samples</a>
TPS3124G15DBVR	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	PBRI	<a href="#">Samples</a>
TPS3124J12DBVR	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	PBQI	<a href="#">Samples</a>
TPS3124J12DBVT	ACTIVE	SOT-23	DBV	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	PBQI	<a href="#">Samples</a>
TPS3124J18DBVR	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	PBSI	<a href="#">Samples</a>
TPS3124J18DBVT	ACTIVE	SOT-23	DBV	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	PBSI	<a href="#">Samples</a>
TPS3125G15DBVR	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	PBUI	<a href="#">Samples</a>
TPS3125G15DBVRG4	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	PBUI	<a href="#">Samples</a>
TPS3125G15DBVT	ACTIVE	SOT-23	DBV	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	PBUI	<a href="#">Samples</a>
TPS3125G15DBVTG4	ACTIVE	SOT-23	DBV	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	PBUI	<a href="#">Samples</a>
TPS3125J12DBVR	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	PBTI	<a href="#">Samples</a>
TPS3125J12DBVT	ACTIVE	SOT-23	DBV	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	PBTI	<a href="#">Samples</a>
TPS3125J18DBVR	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	PBVI	<a href="#">Samples</a>
TPS3125J18DBVRG4	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	PBVI	<a href="#">Samples</a>

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
TPS3125J18DBVT	ACTIVE	SOT-23	DBV	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	PBVI	<a href="#">Samples</a>
TPS3125J18DBVTG4	ACTIVE	SOT-23	DBV	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	PBVI	<a href="#">Samples</a>
TPS3125L30DBVR	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	PBXI	<a href="#">Samples</a>
TPS3125L30DBVRG4	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	PBXI	<a href="#">Samples</a>
TPS3125L30DBVT	ACTIVE	SOT-23	DBV	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	PBXI	<a href="#">Samples</a>
TPS3126E12DBVR	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	PFOI	<a href="#">Samples</a>
TPS3126E12DBVT	ACTIVE	SOT-23	DBV	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	PFOI	<a href="#">Samples</a>
TPS3126E15DBVR	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	PFPI	<a href="#">Samples</a>
TPS3126E15DBVT	ACTIVE	SOT-23	DBV	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	PFPI	<a href="#">Samples</a>
TPS3126E18DBVR	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	PFQI	<a href="#">Samples</a>
TPS3126E18DBVT	ACTIVE	SOT-23	DBV	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	PFQI	<a href="#">Samples</a>
TPS3128E12DBVT	ACTIVE	SOT-23	DBV	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	PFRI	<a href="#">Samples</a>
TPS3128E12DBVTG4	ACTIVE	SOT-23	DBV	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	PFRI	<a href="#">Samples</a>
TPS3128E15DBVR	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	PFSI	<a href="#">Samples</a>
TPS3128E15DBVT	ACTIVE	SOT-23	DBV	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	PFSI	<a href="#">Samples</a>
TPS3128E18DBVR	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	PFTI	<a href="#">Samples</a>
TPS3128E18DBVT	ACTIVE	SOT-23	DBV	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	PFTI	<a href="#">Samples</a>
TPS3128E18DBVTG4	ACTIVE	SOT-23	DBV	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	PFTI	<a href="#">Samples</a>

(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.

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

(2) **RoHS:** TI defines "RoHS" to mean semiconductor products that are compliant with the current EU RoHS requirements for all 10 RoHS substances, including the requirement that RoHS substance do not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, "RoHS" products are suitable for use in specified lead-free processes. TI may reference these types of products as "Pb-Free".

**RoHS Exempt:** TI defines "RoHS Exempt" to mean products that contain lead but are compliant with EU RoHS pursuant to a specific EU RoHS exemption.

**Green:** TI defines "Green" to mean the content of Chlorine (Cl) and Bromine (Br) based flame retardants meet JS709B low halogen requirements of  $\leq 1000$ ppm threshold. Antimony trioxide based flame retardants must also meet the  $\leq 1000$ ppm threshold requirement.

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

(4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

(5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

(6) **Lead/Ball Finish** - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead/Ball Finish values may wrap to two lines if the finish value exceeds the maximum column width.

**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.

## TAPE AND REEL INFORMATION



### QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
TPS3123J12DBVR	SOT-23	DBV	5	3000	180.0	9.0	3.15	3.2	1.4	4.0	8.0	Q3
TPS3123J12DBVT	SOT-23	DBV	5	250	180.0	9.0	3.15	3.2	1.4	4.0	8.0	Q3
TPS3123J18DBVR	SOT-23	DBV	5	3000	180.0	9.0	3.15	3.2	1.4	4.0	8.0	Q3
TPS3123J18DBVT	SOT-23	DBV	5	250	180.0	9.0	3.15	3.2	1.4	4.0	8.0	Q3
TPS3124G15DBVR	SOT-23	DBV	5	3000	180.0	9.0	3.15	3.2	1.4	4.0	8.0	Q3
TPS3124J12DBVR	SOT-23	DBV	5	3000	180.0	9.0	3.15	3.2	1.4	4.0	8.0	Q3
TPS3124J12DBVT	SOT-23	DBV	5	250	180.0	9.0	3.15	3.2	1.4	4.0	8.0	Q3
TPS3124J18DBVR	SOT-23	DBV	5	3000	180.0	9.0	3.15	3.2	1.4	4.0	8.0	Q3
TPS3124J18DBVT	SOT-23	DBV	5	250	180.0	9.0	3.15	3.2	1.4	4.0	8.0	Q3
TPS3125G15DBVR	SOT-23	DBV	5	3000	180.0	9.0	3.15	3.2	1.4	4.0	8.0	Q3
TPS3125G15DBVT	SOT-23	DBV	5	250	180.0	9.0	3.15	3.2	1.4	4.0	8.0	Q3
TPS3125J12DBVR	SOT-23	DBV	5	3000	180.0	9.0	3.15	3.2	1.4	4.0	8.0	Q3
TPS3125J12DBVT	SOT-23	DBV	5	250	180.0	9.0	3.15	3.2	1.4	4.0	8.0	Q3
TPS3125J18DBVR	SOT-23	DBV	5	3000	180.0	9.0	3.15	3.2	1.4	4.0	8.0	Q3
TPS3125J18DBVT	SOT-23	DBV	5	250	180.0	9.0	3.15	3.2	1.4	4.0	8.0	Q3
TPS3125L30DBVR	SOT-23	DBV	5	3000	180.0	9.0	3.15	3.2	1.4	4.0	8.0	Q3
TPS3125L30DBVT	SOT-23	DBV	5	250	180.0	9.0	3.15	3.2	1.4	4.0	8.0	Q3
TPS3126E12DBVR	SOT-23	DBV	5	3000	180.0	9.0	3.15	3.2	1.4	4.0	8.0	Q3

Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
TPS3126E12DBVT	SOT-23	DBV	5	250	180.0	9.0	3.15	3.2	1.4	4.0	8.0	Q3
TPS3126E15DBVR	SOT-23	DBV	5	3000	180.0	9.0	3.15	3.2	1.4	4.0	8.0	Q3
TPS3126E15DBVT	SOT-23	DBV	5	250	180.0	9.0	3.15	3.2	1.4	4.0	8.0	Q3
TPS3126E18DBVR	SOT-23	DBV	5	3000	180.0	9.0	3.15	3.2	1.4	4.0	8.0	Q3
TPS3126E18DBVT	SOT-23	DBV	5	250	180.0	9.0	3.15	3.2	1.4	4.0	8.0	Q3
TPS3128E12DBVT	SOT-23	DBV	5	250	180.0	9.0	3.15	3.2	1.4	4.0	8.0	Q3
TPS3128E15DBVR	SOT-23	DBV	5	3000	180.0	9.0	3.15	3.2	1.4	4.0	8.0	Q3
TPS3128E15DBVT	SOT-23	DBV	5	250	180.0	9.0	3.15	3.2	1.4	4.0	8.0	Q3
TPS3128E18DBVR	SOT-23	DBV	5	3000	180.0	9.0	3.15	3.2	1.4	4.0	8.0	Q3
TPS3128E18DBVT	SOT-23	DBV	5	250	180.0	9.0	3.15	3.2	1.4	4.0	8.0	Q3

**TAPE AND REEL BOX DIMENSIONS**


\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
TPS3123J12DBVR	SOT-23	DBV	5	3000	182.0	182.0	20.0
TPS3123J12DBVT	SOT-23	DBV	5	250	182.0	182.0	20.0
TPS3123J18DBVR	SOT-23	DBV	5	3000	182.0	182.0	20.0
TPS3123J18DBVT	SOT-23	DBV	5	250	182.0	182.0	20.0
TPS3124G15DBVR	SOT-23	DBV	5	3000	182.0	182.0	20.0
TPS3124J12DBVR	SOT-23	DBV	5	3000	182.0	182.0	20.0
TPS3124J12DBVT	SOT-23	DBV	5	250	182.0	182.0	20.0



Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
TPS3124J18DBVR	SOT-23	DBV	5	3000	182.0	182.0	20.0
TPS3124J18DBVT	SOT-23	DBV	5	250	182.0	182.0	20.0
TPS3125G15DBVR	SOT-23	DBV	5	3000	182.0	182.0	20.0
TPS3125G15DBVT	SOT-23	DBV	5	250	182.0	182.0	20.0
TPS3125J12DBVR	SOT-23	DBV	5	3000	182.0	182.0	20.0
TPS3125J12DBVT	SOT-23	DBV	5	250	182.0	182.0	20.0
TPS3125J18DBVR	SOT-23	DBV	5	3000	182.0	182.0	20.0
TPS3125J18DBVT	SOT-23	DBV	5	250	182.0	182.0	20.0
TPS3125L30DBVR	SOT-23	DBV	5	3000	182.0	182.0	20.0
TPS3125L30DBVT	SOT-23	DBV	5	250	182.0	182.0	20.0
TPS3126E12DBVR	SOT-23	DBV	5	3000	182.0	182.0	20.0
TPS3126E12DBVT	SOT-23	DBV	5	250	182.0	182.0	20.0
TPS3126E15DBVR	SOT-23	DBV	5	3000	182.0	182.0	20.0
TPS3126E15DBVT	SOT-23	DBV	5	250	182.0	182.0	20.0
TPS3126E18DBVR	SOT-23	DBV	5	3000	182.0	182.0	20.0
TPS3126E18DBVT	SOT-23	DBV	5	250	182.0	182.0	20.0
TPS3128E12DBVT	SOT-23	DBV	5	250	182.0	182.0	20.0
TPS3128E15DBVR	SOT-23	DBV	5	3000	182.0	182.0	20.0
TPS3128E15DBVT	SOT-23	DBV	5	250	182.0	182.0	20.0
TPS3128E18DBVR	SOT-23	DBV	5	3000	182.0	182.0	20.0
TPS3128E18DBVT	SOT-23	DBV	5	250	182.0	182.0	20.0

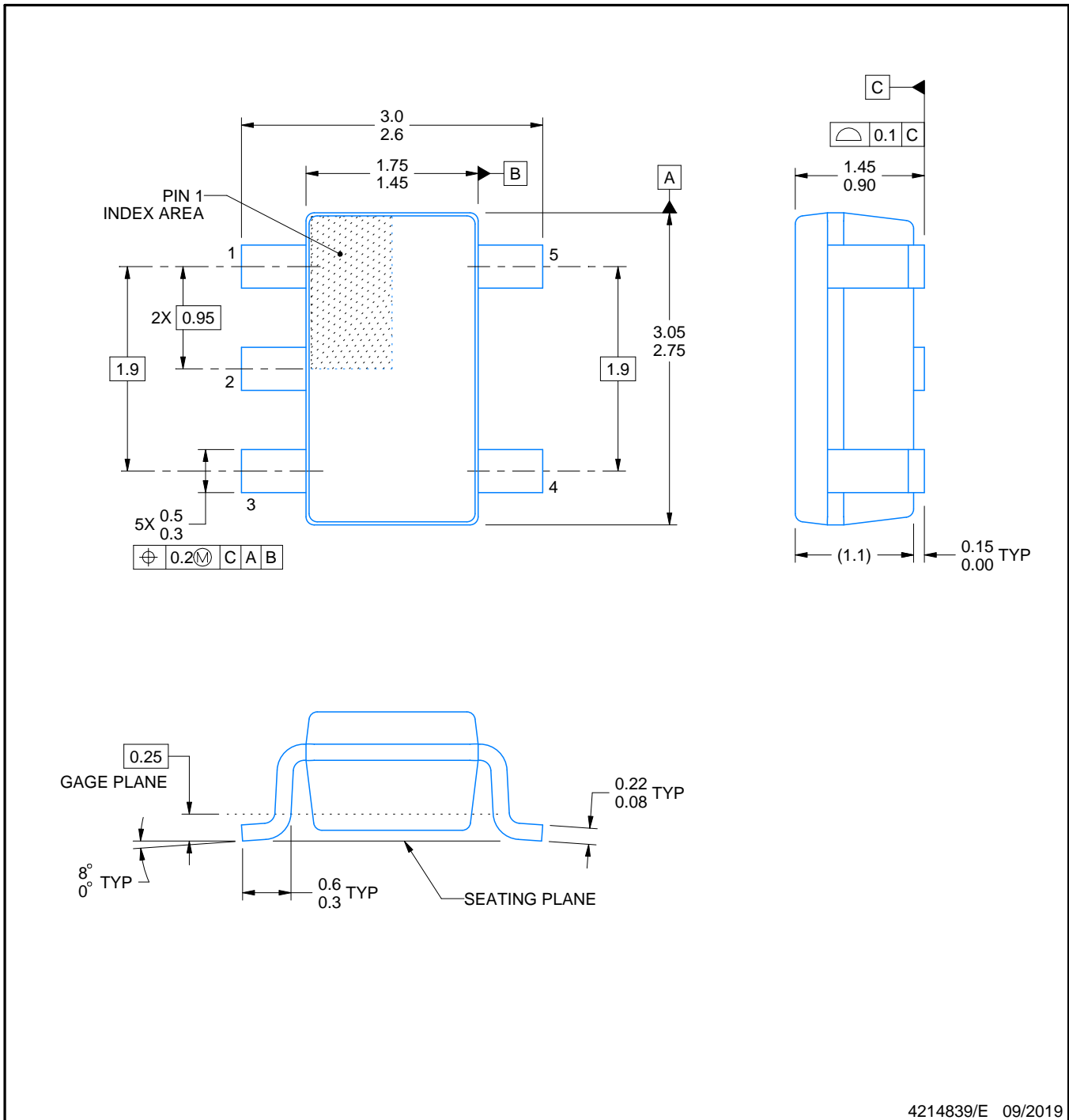


DBV0005A

# PACKAGE OUTLINE

SOT-23 - 1.45 mm max height

SMALL OUTLINE TRANSISTOR



4214839/E 09/2019

## NOTES:

1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. Reference JEDEC MO-178.
4. Body dimensions do not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 mm per side.

# EXAMPLE BOARD LAYOUT

DBV0005A

SOT-23 - 1.45 mm max height

SMALL OUTLINE TRANSISTOR



LAND PATTERN EXAMPLE  
EXPOSED METAL SHOWN  
SCALE:15X



SOLDER MASK DETAILS

4214839/E 09/2019

NOTES: (continued)

- 5. Publication IPC-7351 may have alternate designs.
- 6. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

# EXAMPLE STENCIL DESIGN

DBV0005A

SOT-23 - 1.45 mm max height

SMALL OUTLINE TRANSISTOR



SOLDER PASTE EXAMPLE  
BASED ON 0.125 mm THICK STENCIL  
SCALE:15X

4214839/E 09/2019

NOTES: (continued)

7. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
8. Board assembly site may have different recommendations for stencil design.

## IMPORTANT NOTICE AND DISCLAIMER

TI PROVIDES TECHNICAL AND RELIABILITY DATA (INCLUDING DATASHEETS), DESIGN RESOURCES (INCLUDING REFERENCE DESIGNS), APPLICATION OR OTHER DESIGN ADVICE, WEB TOOLS, SAFETY INFORMATION, AND OTHER RESOURCES "AS IS" AND WITH ALL FAULTS, AND DISCLAIMS ALL WARRANTIES, EXPRESS AND IMPLIED, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF THIRD PARTY INTELLECTUAL PROPERTY RIGHTS.

These resources are intended for skilled developers designing with TI products. You are solely responsible for (1) selecting the appropriate TI products for your application, (2) designing, validating and testing your application, and (3) ensuring your application meets applicable standards, and any other safety, security, or other requirements. These resources are subject to change without notice. TI grants you permission to use these resources only for development of an application that uses the TI products described in the resource. Other reproduction and display of these resources is prohibited. No license is granted to any other TI intellectual property right or to any third party intellectual property right. TI disclaims responsibility for, and you will fully indemnify TI and its representatives against, any claims, damages, costs, losses, and liabilities arising out of your use of these resources.

TI's products are provided subject to TI's Terms of Sale ([www.ti.com/legal/termsofsale.html](http://www.ti.com/legal/termsofsale.html)) or other applicable terms available either on [ti.com](http://ti.com) or provided in conjunction with such TI products. TI's provision of these resources does not expand or otherwise alter TI's applicable warranties or warranty disclaimers for TI products.

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265  
Copyright © 2019, Texas Instruments Incorporated