

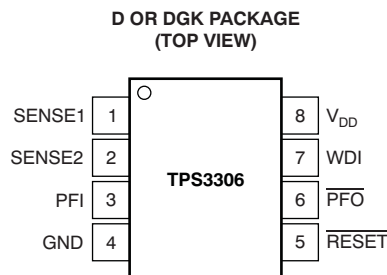
DUAL PROCESSOR SUPERVISORY CIRCUITS WITH POWER-FAIL

FEATURES

- Dual Supervisory Circuits With Power-Fail for DSP and Processor-Based Systems
- Voltage Monitor for Power-Fail or Low-Battery Warning
- Watchdog Timer With 0.8 Second Time-Out
- Power-On Reset Generator With Integrated 100 ms Delay Time
- Open-Drain Reset and Power-Fail Output
- Supply Current of 15 μ A (Typ.)
- Supply Voltage Range: 7 V to 6 V
- Defined $\overline{\text{RESET}}$ Output From $V_{\text{DD}} \geq 1.1$ V
- MSOP-8 and SO-8 Packages
- Temperature Range: -40°C to $+85^{\circ}\text{C}$

APPLICATIONS

- Multivoltage DSPs and Processors
- Portable Battery-Powered Equipment
- Embedded Control Systems
- Intelligent Instruments
- Automotive Systems

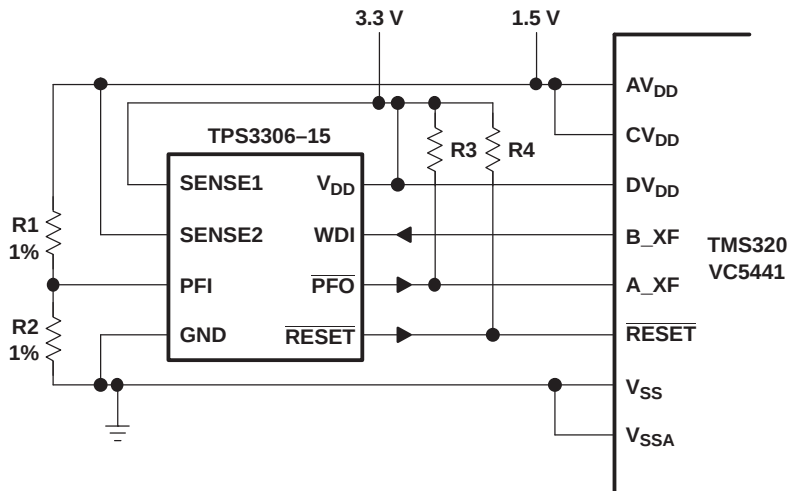


DESCRIPTION

The TPS3306 family is a series of supervisory circuits designed for circuit initialization which require two supply voltages, primarily in DSP and processor-based systems.

The product spectrum of the TPS3306-xx is designed for monitoring two independent supply voltages of 3.3 V/1.5 V, 3.3 V/1.8 V, 3.3 V/2 V, 3.3 V/2.5 V, or 3.3 V/5 V.

TYPICAL OPERATING CIRCUIT



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.



This integrated circuit can be damaged by ESD. Texas Instruments recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage.

ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

AVAILABLE OPTIONS

Table 1. SUPPLY VOLTAGE MONITORING

DEVICE	NOMINAL SUPERVISED VOLTAGE		THRESHOLD VOLTAGE (TYP)	
	SENSE1	SENSE2	SENSE1	SENSE2
TPS3306-15	3.3 V	1.5 V	2.93 V	1.4 V
TPS3306-18	3.3 V	1.8 V	2.93 V	1.68 V
TPS3306-20	3.3 V	2 V	2.93 V	1.85 V
TPS3306-25	3.3 V	2.5 V	2.93 V	2.25 V
TPS3306-33	5 V	3.3 V	4.55 V	2.93 V

For the most current package and ordering information, see the Package Option Addendum at the end of this document, or see the TI website at www.ti.com.

DESCRIPTION (CONTINUED)

The various supervisory circuits are designed to monitor the nominal supply voltage, as shown in the [Supply Voltage Monitoring](#) table.

During power-on, $\overline{\text{RESET}}$ is asserted when the supply voltage V_{DD} becomes higher than 1.1 V. Thereafter, the supervisory circuits monitor the SENSEn inputs and keep $\overline{\text{RESET}}$ active as long as SENSEn remains below the threshold voltage V_{IT} .

An internal timer delays the return of the $\overline{\text{RESET}}$ output to the inactive state (high) to ensure proper system reset. The delay time, $t_{d(\text{typ})} = 100$ ms, starts after SENSE1 and SENSE2 inputs have risen above the threshold voltage V_{IT} . When the voltage at SENSE1 or SENSE2 input drops below the threshold voltage V_{IT} , the output becomes active (low) again.

The integrated power-fail (PFI) comparator with separate open-drain ($\overline{\text{PFO}}$) output can be used for low-battery detection, power-fail warning, or for monitoring a power supply other than the main supply.

The TPS3306-xx devices integrate a watchdog timer that is periodically triggered by a positive or negative transition of WDI. When the supervising system fails to retrigger the watchdog circuit within the time-out interval, $t_{t(\text{out})} = 0.50$ s, $\overline{\text{RESET}}$ becomes active for the time period t_d . This event also reinitializes the watchdog timer. Leaving WDI unconnected disables the watchdog.

The TPS3306-xx devices are available in either 8-pin MSOP or standard 8-pin SO packages, and are characterized for operation over a temperature range of -40°C to $+85^{\circ}\text{C}$.

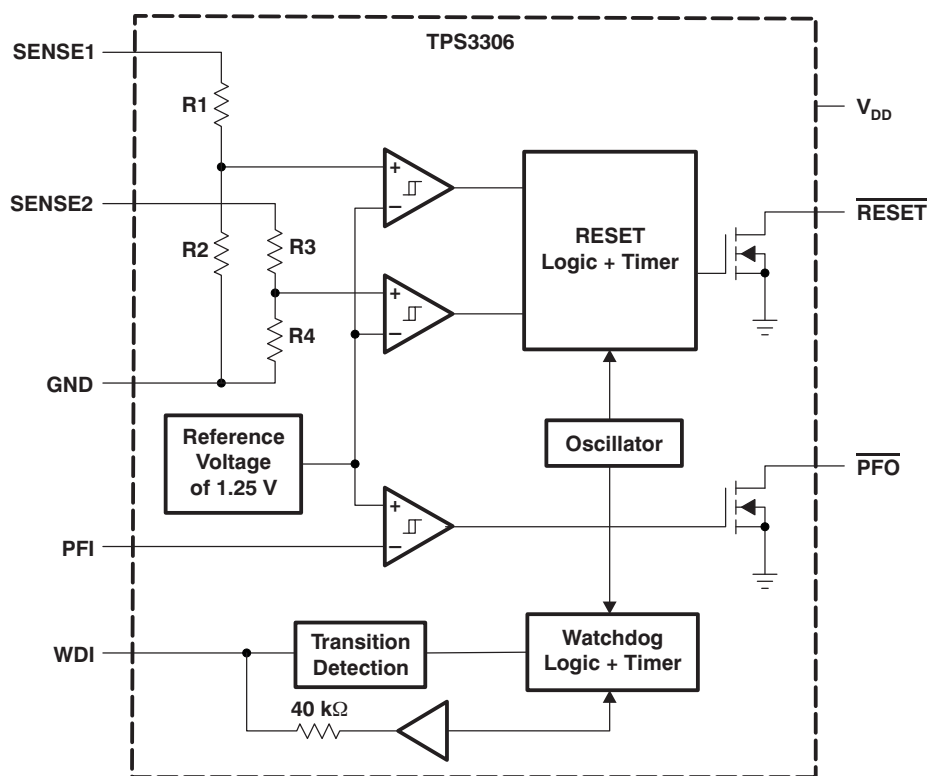
FUNCTION/TRUTH TABLES

$\text{SENSE1} > V_{IT1}$	$\text{SENSE2} > V_{IT2}$	$\overline{\text{RESET}}$
0	0	L
0	1	L
1	0	L
1	1	H

FUNCTION/TRUTH TABLES

$\text{PFI} > V_{IT}$	$\overline{\text{PFO}}$
0	L
1	H

FUNCTIONAL BLOCK DIAGRAM



TIMING DIAGRAM

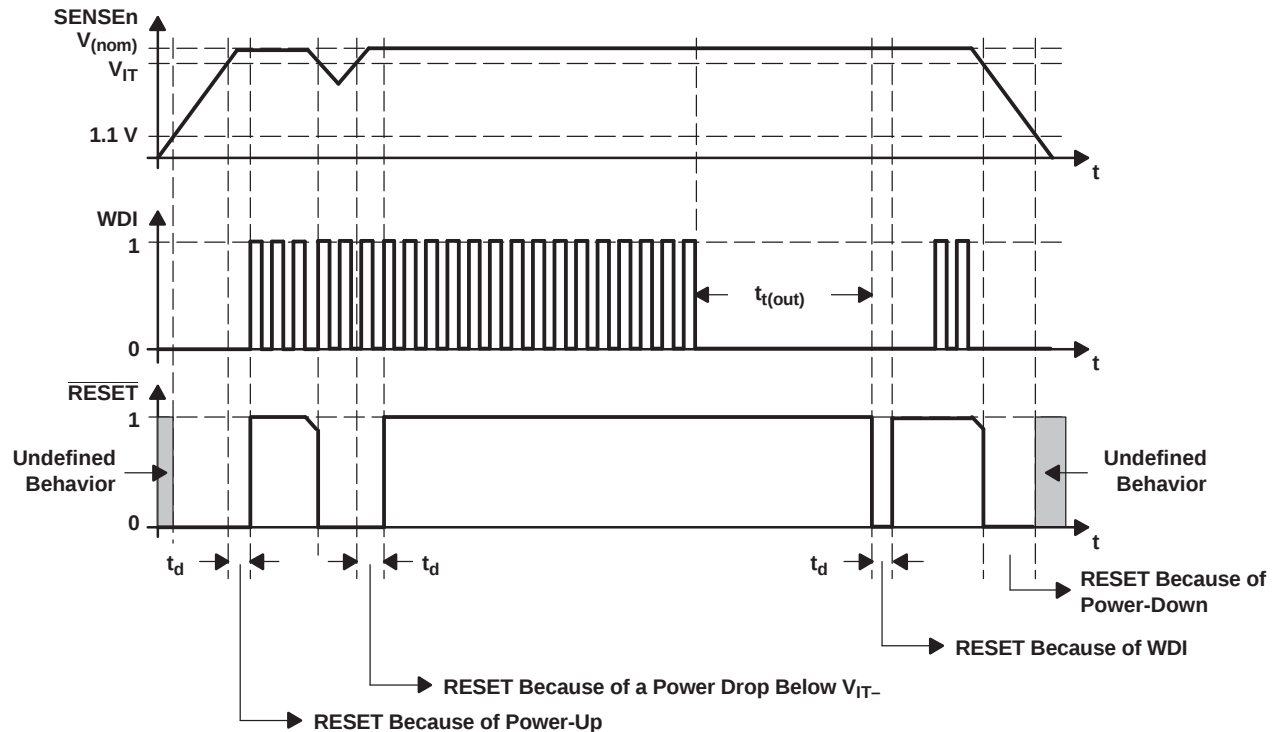


Table 4. Terminal Functions

TERMINAL NAME	NO.	I/O	DESCRIPTION
GND	4	I	Ground
PFI	3	I	Power-fail comparator input
$\overline{PFO}$	6	O	Power-fail comparator output, open-drain
$\overline{RESET}$	5	O	Active-low reset output, open-drain
SENSE1	1	I	Sense voltage input 1
SENSE2	2	I	Sense voltage input 2
WDI	7	I	Watchdog timer input
V_{DD}	8	I	Supply voltage

DETAILED DESCRIPTION

Watchdog

In a microprocessor- or DSP-based system, it is not only important to supervise the supply voltage, it is also important to ensure correct program execution. The task of a watchdog is to ensure that the program is not stalled in an indefinite loop. The microprocessor, microcontroller, or DSP typically has to toggle the watchdog input within 0.8 s to avoid a time-out occurring. Either a low-to-high or a high-to-low transition resets the internal watchdog timer. If the input is unconnected or tied with a high impedance driver, the watchdog is disabled and will be retriggered internally.

DETAILED DESCRIPTION (continued)

Saving Current While Using the Watchdog

The watchdog input is internally driven low during the first 7/8 of the watchdog time-out period, then momentarily pulses high, resetting the watchdog counter. For minimum watchdog input current (minimum overall power consumption), leave WDI low for the majority of the watchdog time-out period, pulsing it low-high-low once within 7/8 of the watchdog time-out period to reset the watchdog timer. If instead WDI is externally driven high for the majority of the time-out period, a current of $5\text{ V}/40\text{ k}\Omega = 125\text{ }\mu\text{A}$ can flow into WDI.

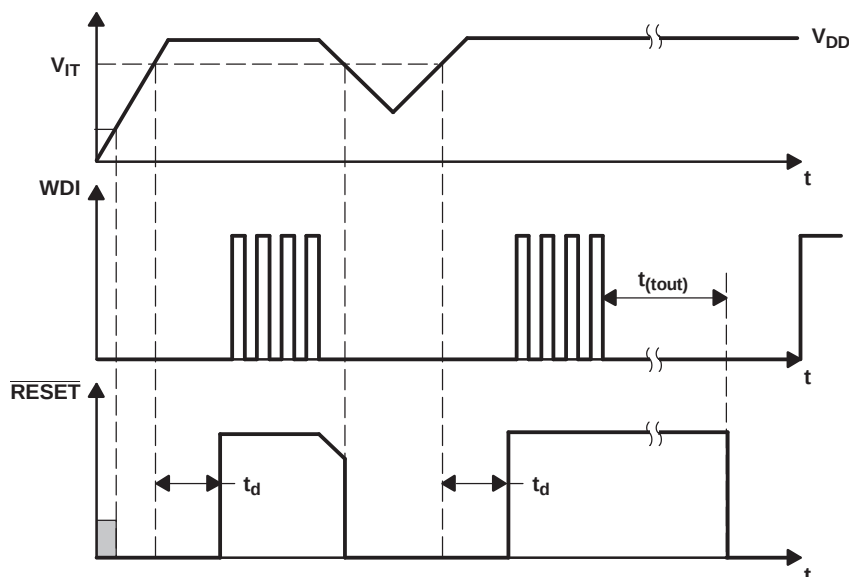
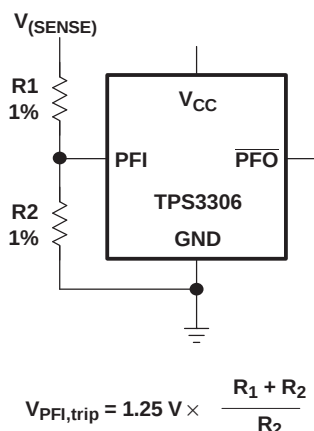


Figure 1. Watchdog Timing

Power-Fail Comparator (PFI and PFO)

An additional comparator is provided to monitor voltages other than the nominal supply voltage. The power-fail-input (PFI) will be compared with an internal voltage reference of 1.25 V. If the input voltage falls below the power-fail threshold (V_{PFI}) of typ. 1.25 V, the power-fail output ($\overline{\text{PFO}}$) goes low. If it goes above 1.25 V plus about 10 mV hysteresis, the output returns to high. By connecting two external resistors, it is possible to supervise any voltages above 1.25 V. The sum of both resistors should be about 1 M Ω , to minimize power consumption and also to assure that the current in the PFI pin can be neglected compared with the current through the resistor network. The tolerance of the external resistors should be not more than 1% to ensure minimal variation of sensed voltage. If the power-fail comparator is unused, connect PFI to ground and leave $\overline{\text{PFO}}$ unconnected.



ABSOLUTE MAXIMUM RATINGS

Over operating free-air temperature range (unless otherwise noted).⁽¹⁾

	UNIT
Supply voltage, V_{DD} (see ⁽²⁾)	7 V
PFI pin	–0.3 V to $V_{DD} + 0.3$ V
All other pins (see ⁽²⁾)	–0.3 V to 7 V
Maximum low output current, I_{OL}	5 mA
Maximum high output current, I_{OH}	– 5 mA
Input clamp current, I_{IK} ($V_I < 0$ or $V_I > V_{DD}$)	±20 mA
Output clamp current, I_{OK} ($V_O < 0$ or $V_O > V_{DD}$)	±20 mA
Continuous total power dissipation	See Dissipation Rating Table
Operating free-air temperature range, T_A	–40°C to +85°C
Storage temperature range, T_{stg}	–65°C to +150°C
Soldering temperature	260°C

- (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.
- (2) All voltage values are with respect to GND. For reliable operation, the device must not be operated at 7 V for more than $t = 1000$ h continuously.

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
DGK	424 mW	3.4 mW/°C	271 mW	220 mW
D	725 mW	5.8 mW/°C	464 mW	377 mW

RECOMMENDED OPERATING CONDITIONS

At specified temperature range.

	MIN	MAX	UNIT
Supply voltage, V_{DD}	2.7	6	V
Input voltage at WDI and PFI, V_I	0	$V_{DD} + 0.3$	V
Input voltage at SENSE1 and SENSE2, V_I	0	$(V_{DD} + 0.3)V_{IT}/1.25$ V	V
High-level input voltage at WDI, V_{IH}	$0.7 \times V_{DD}$		V
Low-level input voltage at WDI, V_{IL}		$0.3 \times V_{DD}$	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 _{OL}	Low-level output voltage	$\overline{\text{RESET}}$, PFO	V _{DD} = 2.7 V to 6 V, I _{OL} = 20 μA			0.2	V		
			V _{DD} = 3.3 V, I _{OL} = 2 mA			0.4			
			V _{DD} = 6 V, I _{OL} = 3 mA			0.4			
Power-up reset voltage (see ⁽¹⁾)			V _{DD} ≥ 1.1 V, I _{OL} = 20 μA			0.4	V		
V _{IT}	Negative-going input threshold voltage (see ⁽²⁾)	V _{SENSE1} , V _{SENSE2}	V _{DD} = 2.7 V to 6 V T _A = 0°C to +85°C		1.37	1.40	1.43	V	
					1.64	1.68	1.72		
					1.81	1.85	1.89		
					2.20	2.25	2.30		
					2.86	2.93	3		
					4.46	4.55	4.64		
		PFI	V _{SENSE1} , V _{SENSE2}	V _{DD} = 2.7 V to 6 V T _A = −40°C to +85°C		1.22	1.25	1.28	V
						1.37	1.40	1.44	
						1.64	1.68	1.73	
						1.81	1.85	1.90	
						2.20	2.25	2.32	
						2.86	2.93	3.02	
PFI		1.22	1.25	1.29					
V _{hys}	Hysteresis	PFI	V _{IT} = 1.25 V			10	mV		
		V _{SENSEn}	V _{IT} = 1.40 V			15			
			V _{IT} = 1.68 V			15			
			V _{IT} = 1.86 V			20			
			V _{IT} = 2.25 V			20			
			V _{IT} = 2.93 V			30			
			V _{IT} = 4.55 V			40			
I _{H(AV)}	Average high-level input current	WDI	WDI = V _{DD} = 6 V, Time average (dc = 88%)		100	150	μA		
I _{L(AV)}	Average low-level input current		WDI = 0 V, V _{DD} = 6 V, Time average (dc = 12%)		−15	−20			
I _H	High-level input current	WDI	WDI = V _{DD} = 6 V		120	170	μA		
		SENSE1	V _{SENSE1} = V _{DD} = 6 V		5	8			
		SENSE2	V _{SENSE2} = V _{DD} = 6 V		6	9			
I _L	Low-level input current	WDI	WDI = 0 V, V _{DD} = 6 V		−120	−170	μA		
I _I	Input current	PFI	V _{DD} = 6 V, 0 V ≤ V _I ≤ V _{DD}		−25	25	nA		
I _{DD}	Supply current				15	40	μA		
C _i	Input capacitance		V _I = 0 V to V _{DD}		10		pF		

(1) The lowest supply voltage at which $\overline{\text{RESET}}$ becomes active. t_r, V_{DD} $\geq$ 15 μ S/V.

(2) To ensure best stability of the threshold voltage, a bypass capacitor (ceramic 0.1 μ F) should be placed close to the supply terminals.

TIMING REQUIREMENTS

at $V_{DD} = 2.7\text{ V}$ to 6 V , $R_L = 1\text{ M}\Omega$, $C_L = 50\text{ pF}$, $T_A = 25^\circ\text{C}$

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_w	Pulse width	SENSEn	$V_{\text{SENSEnL}} = V_{IT-} - 0.2\text{ V}$, $V_{\text{SENSEnH}} = V_{IT+} + 0.2\text{ V}$		6	μs
		WDI	$V_{IH} = 0.7 \times V_{DD}$, $V_{IL} = 0.3 \times V_{DD}$		100	ns

SWITCHING CHARACTERISTICS

at $V_{DD} = 2.7\text{ V}$ to 6 V , $R_L = 1\text{ M}\Omega$, $C_L = 50\text{ pF}$, $T_A = 25^\circ\text{C}$

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
$t_{t(\text{out})}$	Watchdog time-out	$V_{I(\text{SENSEn})} \geq V_{IT+} + 0.2\text{ V}$, See Timing Diagram	0.5	0.8	1.2	s
t_d	Delay time	$V_{I(\text{SENSEn})} \geq V_{IT+} + 0.2\text{ V}$, See Timing Diagram	70	100	140	ms
t_{PHL}	Propagation (delay) time, high-to-low level output	SENSEn to $\overline{\text{RESET}}$		1	5	μs
t_{PHL}	Propagation (delay) time, high-to-low level output	PFI to $\overline{\text{PFO}}$		0.5	1	μs
t_{PLH}	Propagation (delay) time, low-to-high level output					

TYPICAL CHARACTERISTICS

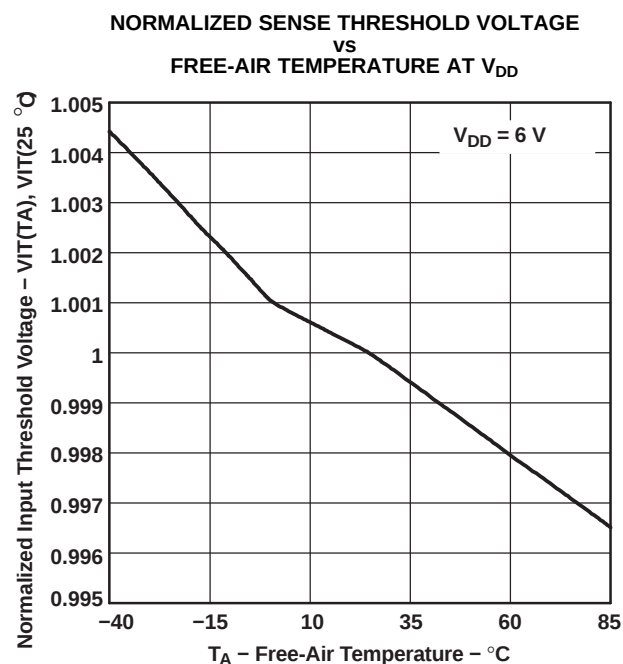


Figure 2.

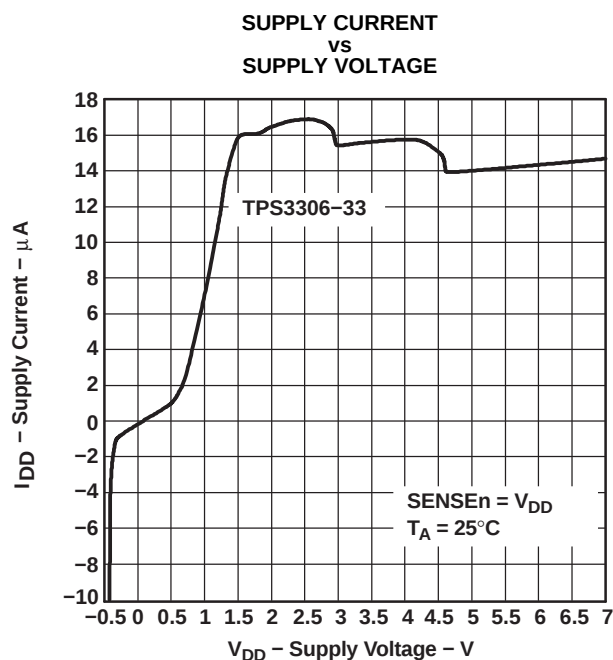


Figure 3.

TYPICAL CHARACTERISTICS (continued)

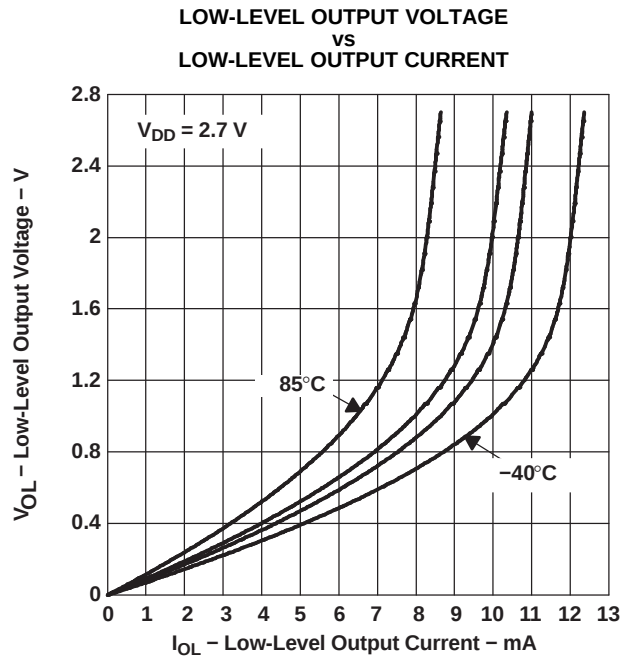


Figure 4.

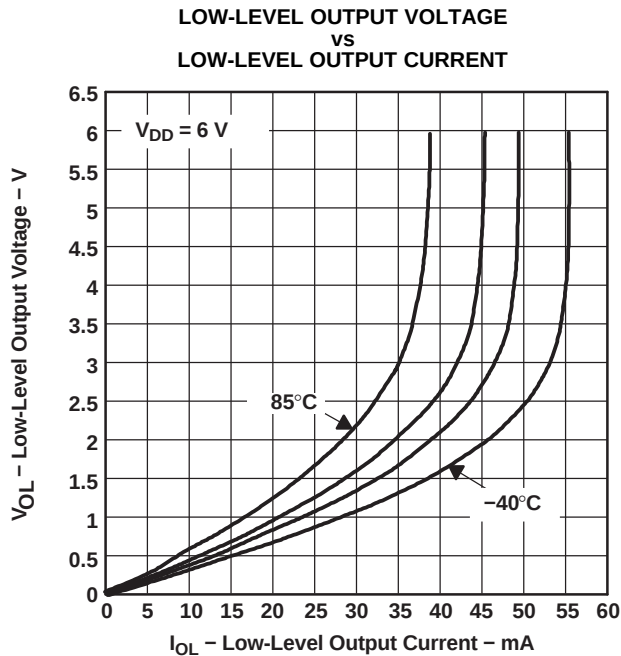


Figure 5.

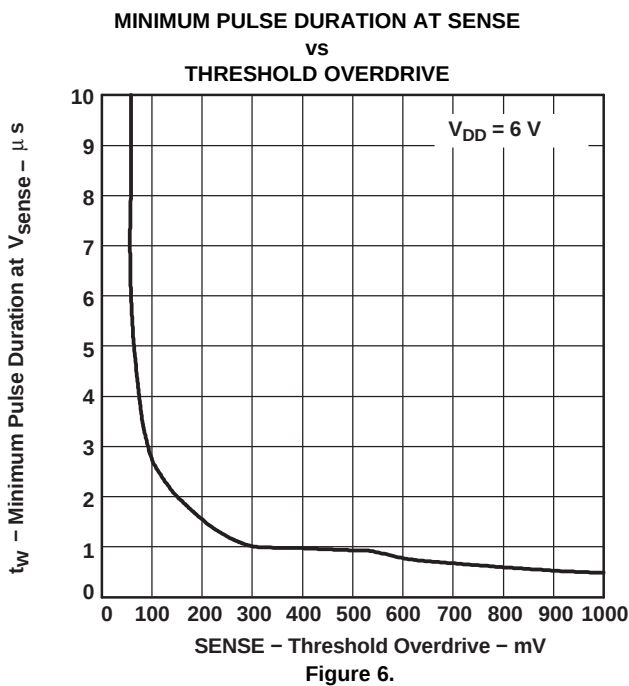


Figure 6.

PACKAGING INFORMATION

Orderable part number	Status (1)	Material type (2)	Package Pins	Package qty Carrier	RoHS (3)	Lead finish/ Ball material (4)	MSL rating/ Peak reflow (5)	Op temp (°C)	Part marking (6)
TPS3306-15D	Active	Production	SOIC (D) 8	75 TUBE	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	30615
TPS3306-15D.A	Active	Production	SOIC (D) 8	75 TUBE	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	30615
TPS3306-15DGK	Active	Production	VSSOP (DGK) 8	80 TUBE	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	AIC
TPS3306-15DGK.A	Active	Production	VSSOP (DGK) 8	80 TUBE	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	AIC
TPS3306-15DGKR	Active	Production	VSSOP (DGK) 8	2500 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	AIC
TPS3306-15DGKR.A	Active	Production	VSSOP (DGK) 8	2500 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	AIC
TPS3306-15DR	Active	Production	SOIC (D) 8	2500 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	30615
TPS3306-15DR.A	Active	Production	SOIC (D) 8	2500 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	30615
TPS3306-18D	Active	Production	SOIC (D) 8	75 TUBE	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	30618
TPS3306-18D.A	Active	Production	SOIC (D) 8	75 TUBE	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	30618
TPS3306-18DGK	Active	Production	VSSOP (DGK) 8	80 TUBE	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	AID
TPS3306-18DGK.A	Active	Production	VSSOP (DGK) 8	80 TUBE	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	AID
TPS3306-18DGKR	Active	Production	VSSOP (DGK) 8	2500 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	AID
TPS3306-18DGKR.A	Active	Production	VSSOP (DGK) 8	2500 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	AID
TPS3306-18DR	Active	Production	SOIC (D) 8	2500 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	30618
TPS3306-18DR.A	Active	Production	SOIC (D) 8	2500 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	30618
TPS3306-20D	Active	Production	SOIC (D) 8	75 TUBE	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	30620
TPS3306-20D.A	Active	Production	SOIC (D) 8	75 TUBE	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	30620
TPS3306-25D	Active	Production	SOIC (D) 8	75 TUBE	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	30625
TPS3306-25D.A	Active	Production	SOIC (D) 8	75 TUBE	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	30625
TPS3306-25DGK	Active	Production	VSSOP (DGK) 8	80 TUBE	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	AIF
TPS3306-25DGK.A	Active	Production	VSSOP (DGK) 8	80 TUBE	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	AIF
TPS3306-25DGKR	Active	Production	VSSOP (DGK) 8	2500 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	AIF
TPS3306-25DGKR.A	Active	Production	VSSOP (DGK) 8	2500 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	AIF
TPS3306-25DR	Active	Production	SOIC (D) 8	2500 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	30625
TPS3306-25DR.A	Active	Production	SOIC (D) 8	2500 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	30625
TPS3306-33D	Active	Production	SOIC (D) 8	75 TUBE	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	30633
TPS3306-33D.A	Active	Production	SOIC (D) 8	75 TUBE	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	30633
TPS3306-33DGK	Active	Production	VSSOP (DGK) 8	80 TUBE	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	AIG

Orderable part number	Status (1)	Material type (2)	Package Pins	Package qty Carrier	RoHS (3)	Lead finish/ Ball material (4)	MSL rating/ Peak reflow (5)	Op temp (°C)	Part marking (6)
TPS3306-33DGK.A	Active	Production	VSSOP (DGK) 8	80 TUBE	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	AIG
TPS3306-33DGKR	Active	Production	VSSOP (DGK) 8	2500 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	AIG
TPS3306-33DGKR.A	Active	Production	VSSOP (DGK) 8	2500 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	AIG
TPS3306-33DR	Active	Production	SOIC (D) 8	2500 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	30633
TPS3306-33DR.A	Active	Production	SOIC (D) 8	2500 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	30633

⁽¹⁾ **Status:** For more details on status, see our [product life cycle](#).

⁽²⁾ **Material type:** When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, reliability performance testing, and/or process qualification, may not yet be complete, and this item is subject to further changes or possible discontinuation. If available for ordering, purchases will be subject to an additional waiver at checkout, and are intended for early internal evaluation purposes only. These items are sold without warranties of any kind.

⁽³⁾ **RoHS values:** Yes, No, RoHS Exempt. See the [TI RoHS Statement](#) for additional information and value definition.

⁽⁴⁾ **Lead finish/Ball material:** Parts may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

⁽⁵⁾ **MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.

⁽⁶⁾ **Part marking:** There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

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.

OTHER QUALIFIED VERSIONS OF TPS3306 :

- Automotive : [TPS3306-Q1](#)

NOTE: Qualified Version Definitions:

- Automotive - Q100 devices qualified for high-reliability automotive applications targeting zero defects

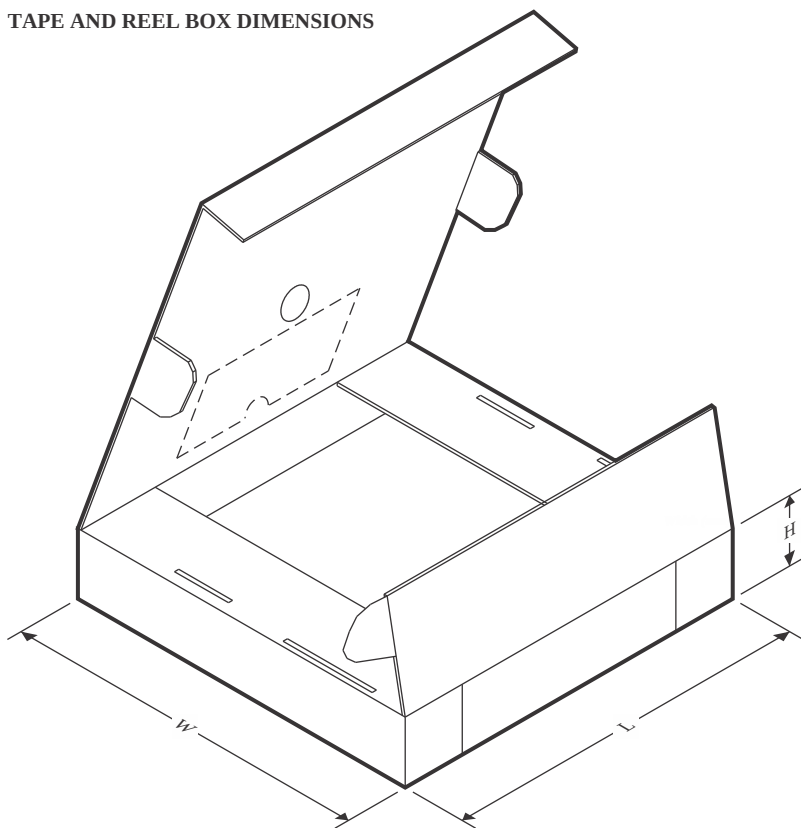
TAPE AND REEL INFORMATION



*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
TPS3306-15DGKR	VSSOP	DGK	8	2500	330.0	12.4	5.3	3.4	1.4	8.0	12.0	Q1
TPS3306-15DR	SOIC	D	8	2500	330.0	12.4	6.4	5.2	2.1	8.0	12.0	Q1
TPS3306-18DGKR	VSSOP	DGK	8	2500	330.0	12.4	5.3	3.4	1.4	8.0	12.0	Q1
TPS3306-18DR	SOIC	D	8	2500	330.0	12.4	6.4	5.2	2.1	8.0	12.0	Q1
TPS3306-25DGKR	VSSOP	DGK	8	2500	330.0	12.4	5.3	3.4	1.4	8.0	12.0	Q1
TPS3306-25DR	SOIC	D	8	2500	330.0	12.4	6.4	5.2	2.1	8.0	12.0	Q1
TPS3306-33DGKR	VSSOP	DGK	8	2500	330.0	12.4	5.3	3.4	1.4	8.0	12.0	Q1
TPS3306-33DR	SOIC	D	8	2500	330.0	12.4	6.4	5.2	2.1	8.0	12.0	Q1

TAPE AND REEL BOX DIMENSIONS



*All dimensions are nominal

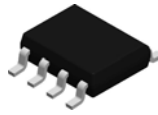
Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
TPS3306-15DGKR	VSSOP	DGK	8	2500	358.0	335.0	35.0
TPS3306-15DR	SOIC	D	8	2500	350.0	350.0	43.0
TPS3306-18DGKR	VSSOP	DGK	8	2500	358.0	335.0	35.0
TPS3306-18DR	SOIC	D	8	2500	350.0	350.0	43.0
TPS3306-25DGKR	VSSOP	DGK	8	2500	358.0	335.0	35.0
TPS3306-25DR	SOIC	D	8	2500	350.0	350.0	43.0
TPS3306-33DGKR	VSSOP	DGK	8	2500	358.0	335.0	35.0
TPS3306-33DR	SOIC	D	8	2500	350.0	350.0	43.0

TUBE



*All dimensions are nominal

Device	Package Name	Package Type	Pins	SPQ	L (mm)	W (mm)	T (μm)	B (mm)
TPS3306-15D	D	SOIC	8	75	505.46	6.76	3810	4
TPS3306-15D.A	D	SOIC	8	75	505.46	6.76	3810	4
TPS3306-18D	D	SOIC	8	75	505.46	6.76	3810	4
TPS3306-18D.A	D	SOIC	8	75	505.46	6.76	3810	4
TPS3306-20D	D	SOIC	8	75	505.46	6.76	3810	4
TPS3306-20D.A	D	SOIC	8	75	505.46	6.76	3810	4
TPS3306-25D	D	SOIC	8	75	505.46	6.76	3810	4
TPS3306-25D.A	D	SOIC	8	75	505.46	6.76	3810	4
TPS3306-33D	D	SOIC	8	75	505.46	6.76	3810	4
TPS3306-33D.A	D	SOIC	8	75	505.46	6.76	3810	4

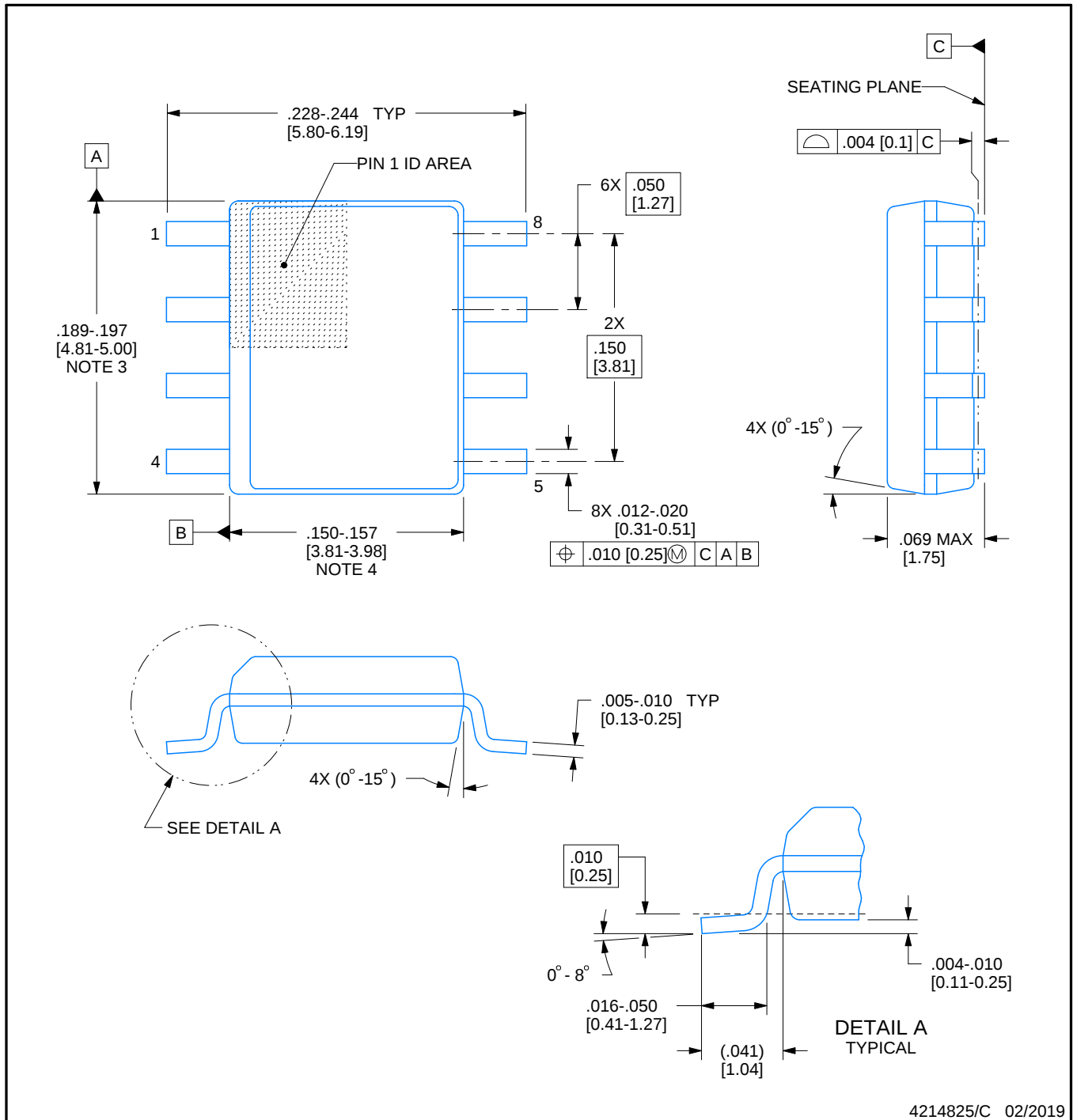


D0008A

PACKAGE OUTLINE

SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT



4214825/C 02/2019

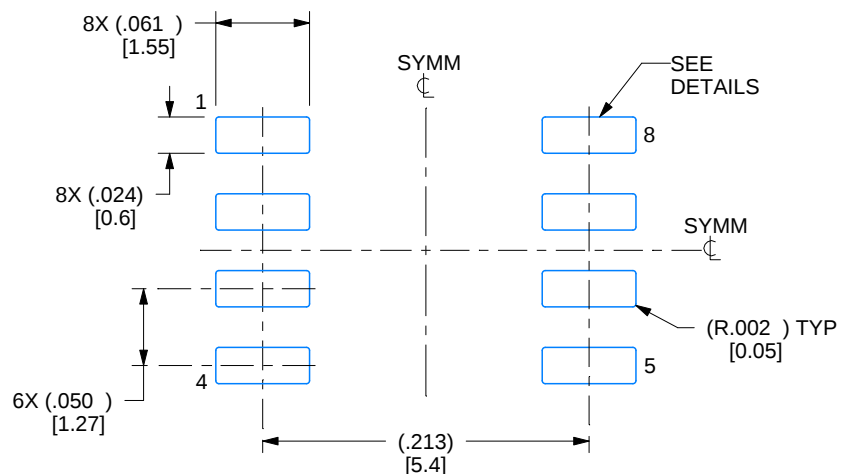
NOTES:

1. Linear dimensions are in inches [millimeters]. Dimensions in parenthesis are for reference only. Controlling dimensions are in inches. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed .006 [0.15] per side.
4. This dimension does not include interlead flash.
5. Reference JEDEC registration MS-012, variation AA.

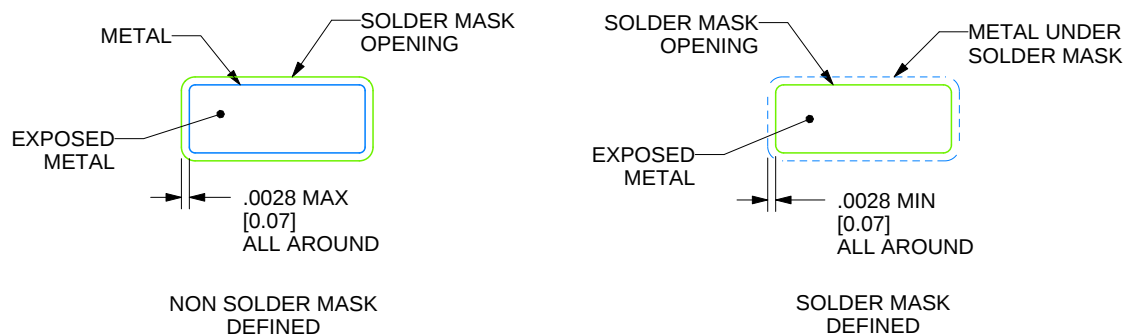
D0008A

SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE:8X



SOLDER MASK DETAILS

4214825/C 02/2019

NOTES: (continued)

6. Publication IPC-7351 may have alternate designs.

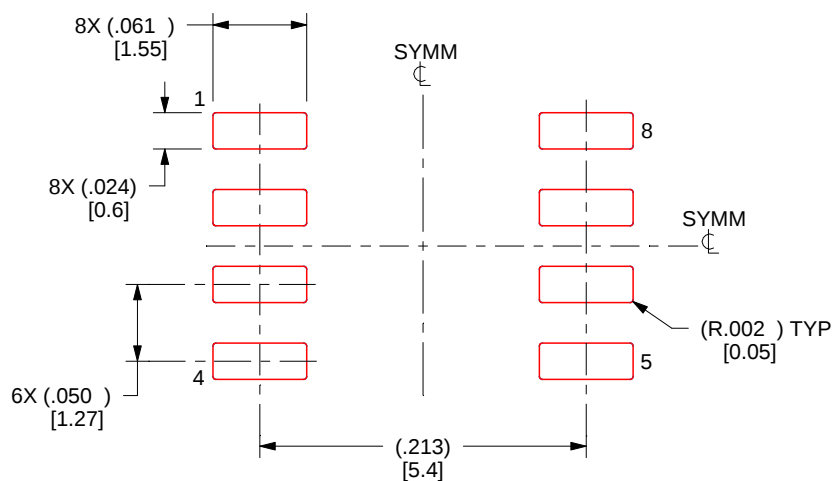
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

EXAMPLE STENCIL DESIGN

D0008A

SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT



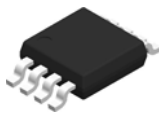
SOLDER PASTE EXAMPLE
BASED ON .005 INCH [0.125 MM] THICK STENCIL
SCALE:8X

4214825/C 02/2019

NOTES: (continued)

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

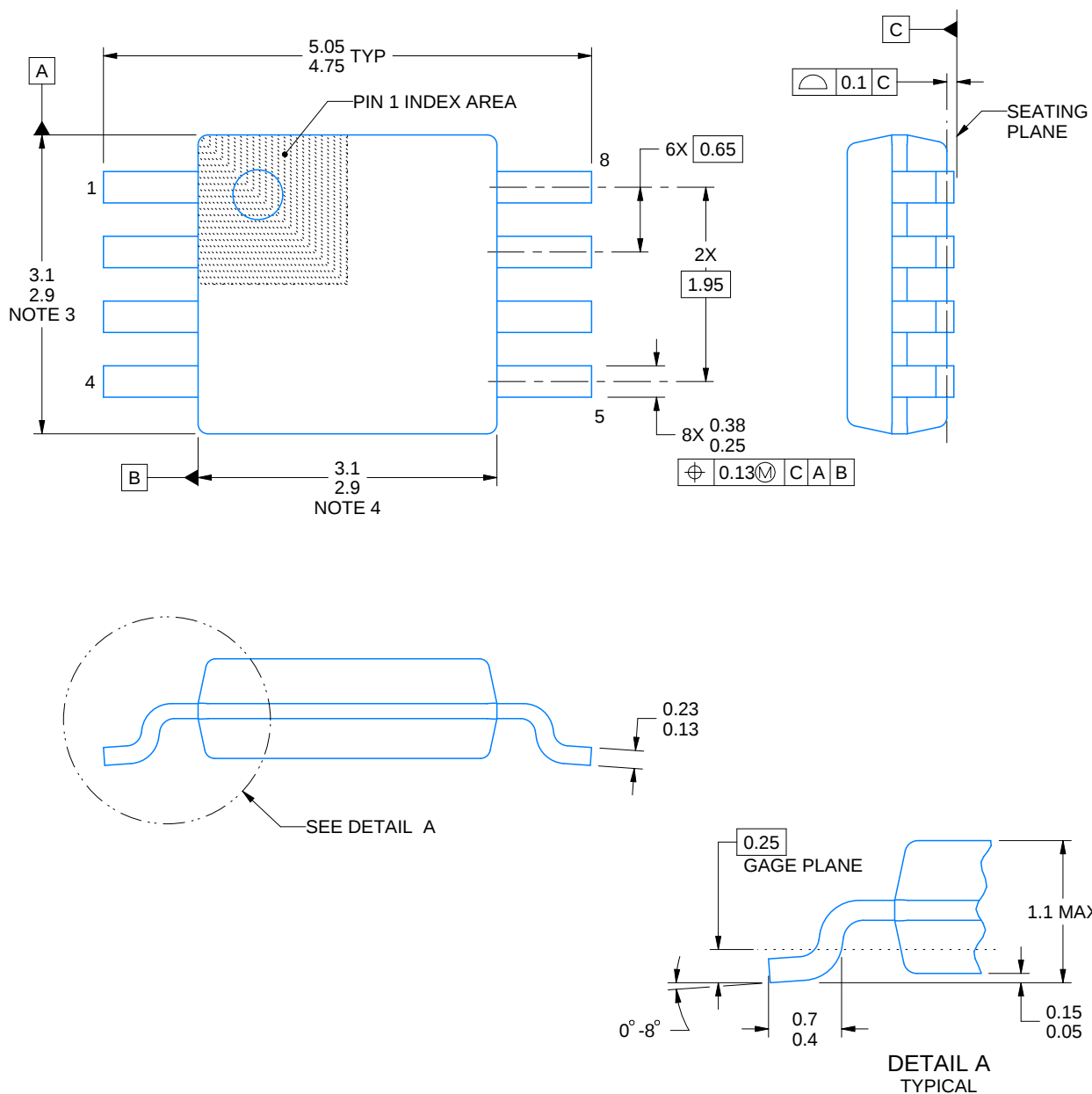
DGK0008A



PACKAGE OUTLINE

VSSOP - 1.1 mm max height

SMALL OUTLINE PACKAGE



4214862/A 04/2023

NOTES:

PowerPAD is a trademark of Texas Instruments.

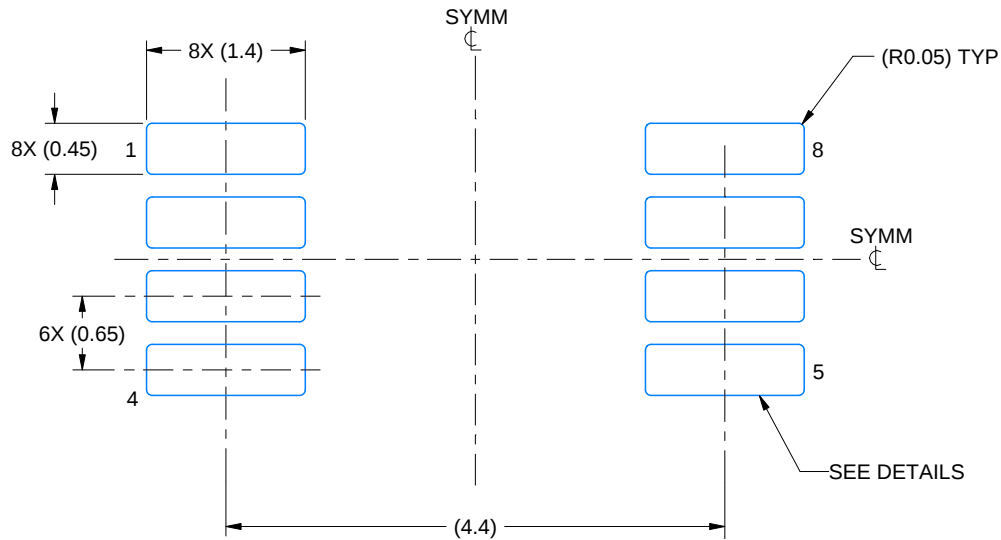
1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 mm per side.
4. This dimension does not include interlead flash. Interlead flash shall not exceed 0.25 mm per side.
5. Reference JEDEC registration MO-187.

EXAMPLE BOARD LAYOUT

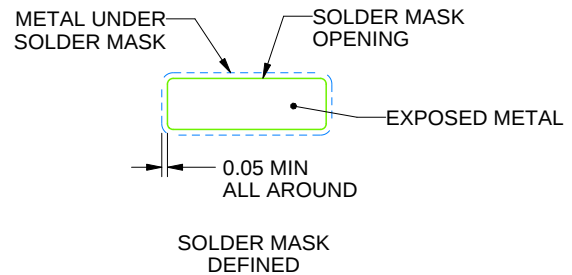
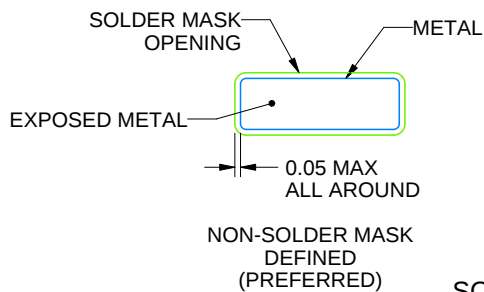
DGK0008A

TM VSSOP - 1.1 mm max height

SMALL OUTLINE PACKAGE



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE: 15X



SOLDER MASK DETAILS

4214862/A 04/2023

NOTES: (continued)

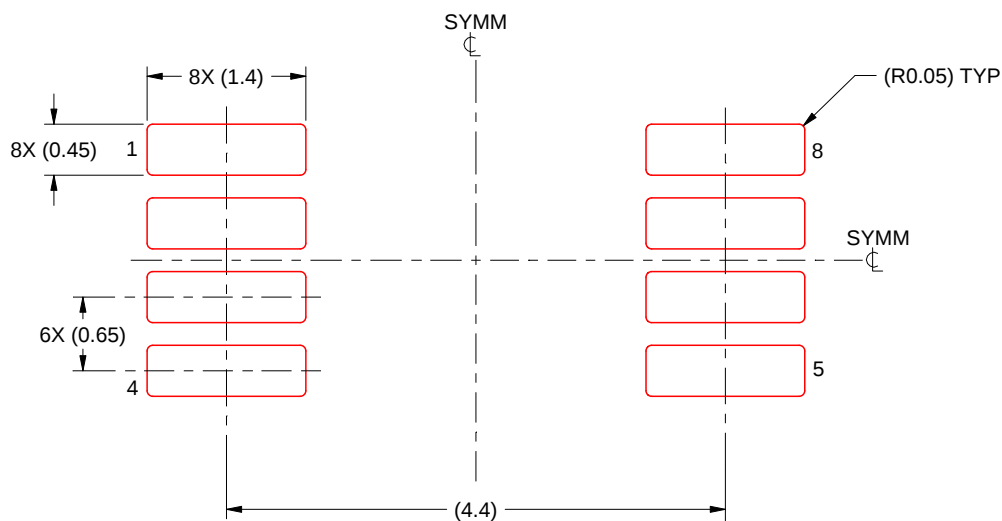
6. Publication IPC-7351 may have alternate designs.
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.
8. Vias are optional depending on application, refer to device data sheet. If any vias are implemented, refer to their locations shown on this view. It is recommended that vias under paste be filled, plugged or tented.
9. Size of metal pad may vary due to creepage requirement.

EXAMPLE STENCIL DESIGN

DGK0008A

TM VSSOP - 1.1 mm max height

SMALL OUTLINE PACKAGE



SOLDER PASTE EXAMPLE
SCALE: 15X

4214862/A 04/2023

NOTES: (continued)

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

IMPORTANT NOTICE AND DISCLAIMER

TI PROVIDES TECHNICAL AND RELIABILITY DATA (INCLUDING DATA SHEETS), 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, regulatory 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](#) or other applicable terms available either on [ti.com](https://www.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.

TI objects to and rejects any additional or different terms you may have proposed.

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265
Copyright © 2025, Texas Instruments Incorporated