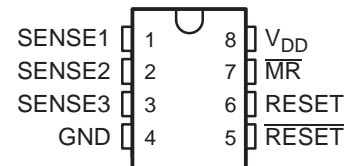


TRIPLE PROCESSOR SUPERVISORS

FEATURES

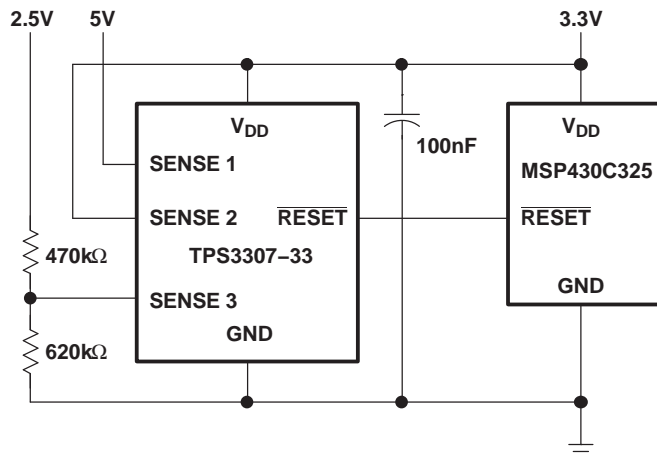
- Triple Supervisory Circuits for DSP and Processor-Based Systems
- Power-On Reset Generator With Fixed Delay Time of 200ms, No External Capacitor Needed
- Temperature-Compensated Voltage Reference
- Maximum Supply Current of 40 μ A
- Supply Voltage Range: 2V to 6V
- Defined $\overline{\text{RESET}}$ Output From $V_{\text{DD}} \geq 1.1\text{V}$
- MSOP-8 and SO-8 Packages
- Temperature Range : -40°C to $+85^{\circ}\text{C}$

D OR DGN PACKAGE
(TOP VIEW)



TYPICAL APPLICATIONS

Figure 1 lists some of the typical applications for the TPS3307 family, and a schematic diagram for a processor-based system application. This application uses TI part numbers [TPS3307-33](#) and [MSP430C325](#).



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

Figure 1. Applications Using the TPS3307 Family

DESCRIPTION

The TPS3307 family is a series of micropower supply voltage supervisors designed for circuit initialization primarily in DSP and processor-based systems, which require more than one supply voltage.

The product spectrum of the TPS3307-xx is designed for monitoring three independent supply voltages: 3.3V/1.8V/adj, 3.3V/2.5V/adj or 3.3V/5V/adj. The adjustable SENSE input allows the monitoring of any supply voltage $>1.25\text{V}$.

The various supply voltage supervisors are designed to monitor the nominal supply voltage as shown in the following [supply voltage monitoring table](#).



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.

PowerPAD is a trademark of Texas Instruments.
All other trademarks are the property of their respective owners.

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

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, $t_{\text{d (typ)}} = 200\text{ms}$, starts after all SENSE_n inputs have risen above the threshold voltage $V_{\text{IT}+}$. When the voltage at any SENSE input drops below the threshold voltage $V_{\text{IT-}}$, the $\overline{\text{RESET}}$ output becomes active (low) again.

The TPS3307-xx family of devices incorporates a manual reset input, $\overline{\text{MR}}$. A low level at $\overline{\text{MR}}$ causes $\overline{\text{RESET}}$ to become active. In addition to the active-low $\overline{\text{RESET}}$ output, the TPS3307-xx family includes an active-high RESET output.

The devices are available in either 8-pin MSOP or standard 8-pin SO packages.

The TPS3307-xx devices are characterized for operation over a temperature range of -40°C to $+85^{\circ}\text{C}$.

SUPPLY VOLTAGE MONITORING

DEVICE	NOMINAL SUPERVISED VOLTAGE			THRESHOLD VOLTAGE (TYP)		
	SENSE1	SENSE2	SENSE3	SENSE1	SENSE2	SENSE3
TPS3307-18	3.3V	1.8V	User defined	2.93V	1.68V	1.25V ⁽¹⁾
TPS3307-25	3.3V	2.5V	User defined	2.93V	2.25V	1.25V ⁽¹⁾
TPS3307-33	5V	3.3V	User defined	4.55V	2.93V	1.25V ⁽¹⁾

(1) The actual sense voltage has to be adjusted by an external resistor divider according to the application requirements.

AVAILABLE OPTIONS⁽¹⁾

T_A	PACKAGED DEVICES		MARKING DGN PACKAGE	CHIP FORM (Y)
	SMALL OUTLINE (D)	PowerPAD™ μ-SMALL OUTLINE (DGN)		
-40°C to $+85^{\circ}\text{C}$	TPS3307-18D	TPS3307-18DGN	TIAAP	TPS3307-18Y
	TPS3307-25D	TPS3307-25DGN	TIAAQ	TPS3307-25Y
	TPS3307-33D	TPS3307-33DGN	TIAAR	TPS3307-33Y

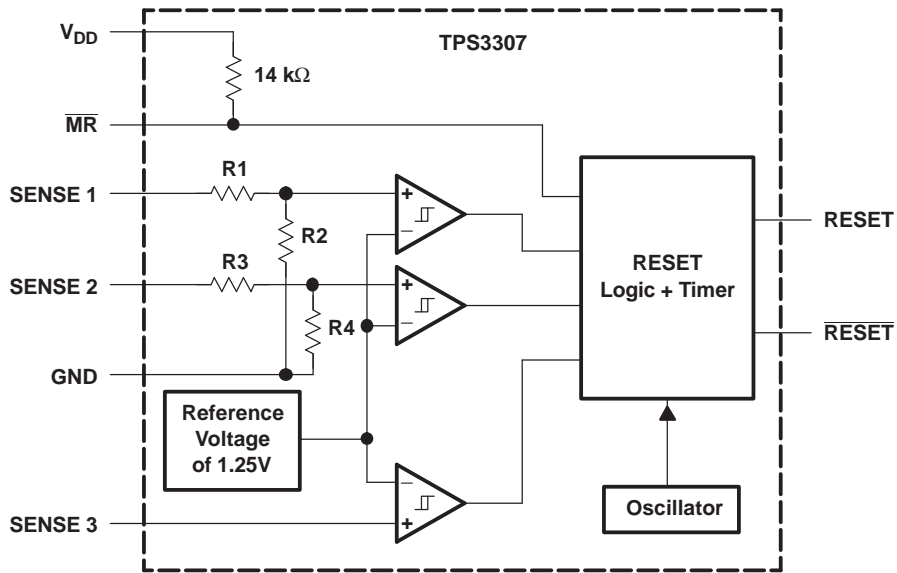
(1) For the most current package and ordering information, see the Package Option Addendum at the end of this document, or see the TI website at www.ti.com.

Function/Truth Tables

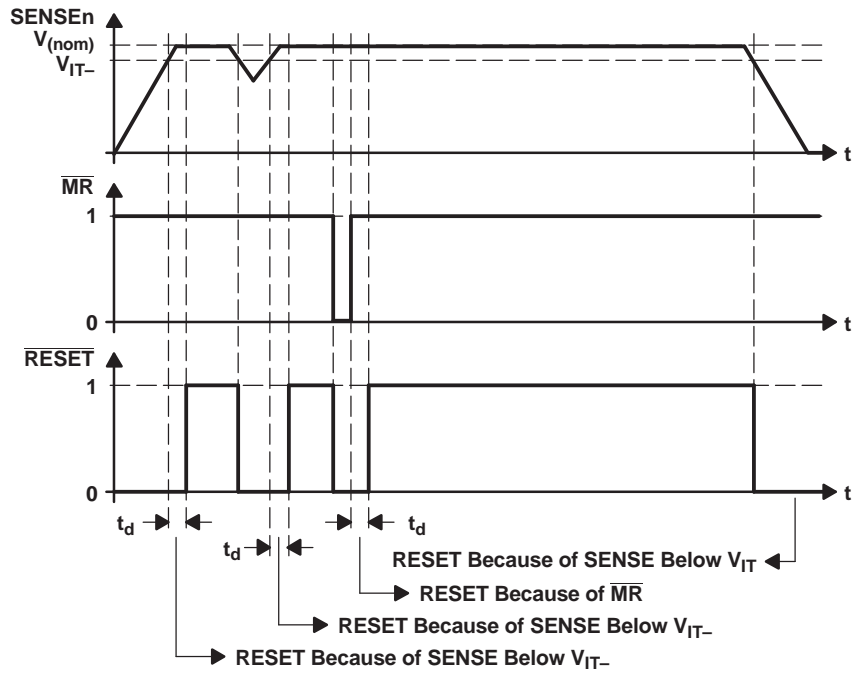
$\overline{\text{MR}}$	$\text{SENSE1} > V_{\text{IT1}}$	$\text{SENSE2} > V_{\text{IT2}}$	$\text{SENSE3} > V_{\text{IT3}}$	$\overline{\text{RESET}}$	RESET
L	X ⁽¹⁾	X ⁽¹⁾	X	L	H
H	0	0	0	L	H
H	0	0	1	L	H
H	0	1	0	L	H
H	0	1	1	L	H
H	1	0	0	L	H
H	1	0	1	L	H
H	1	1	0	L	H
H	1	1	1	H	L

(1) X = Don't care

Functional Block Diagram



Timing Diagram



TPS3307Y Chip Information

These chips, when properly assembled, display characteristics similar to those of the TPS3307. Thermal compression or ultrasonic bonding may take place on the doped aluminium bonding pads. The chips may be mounted with conductive epoxy or a gold-silicon preform.

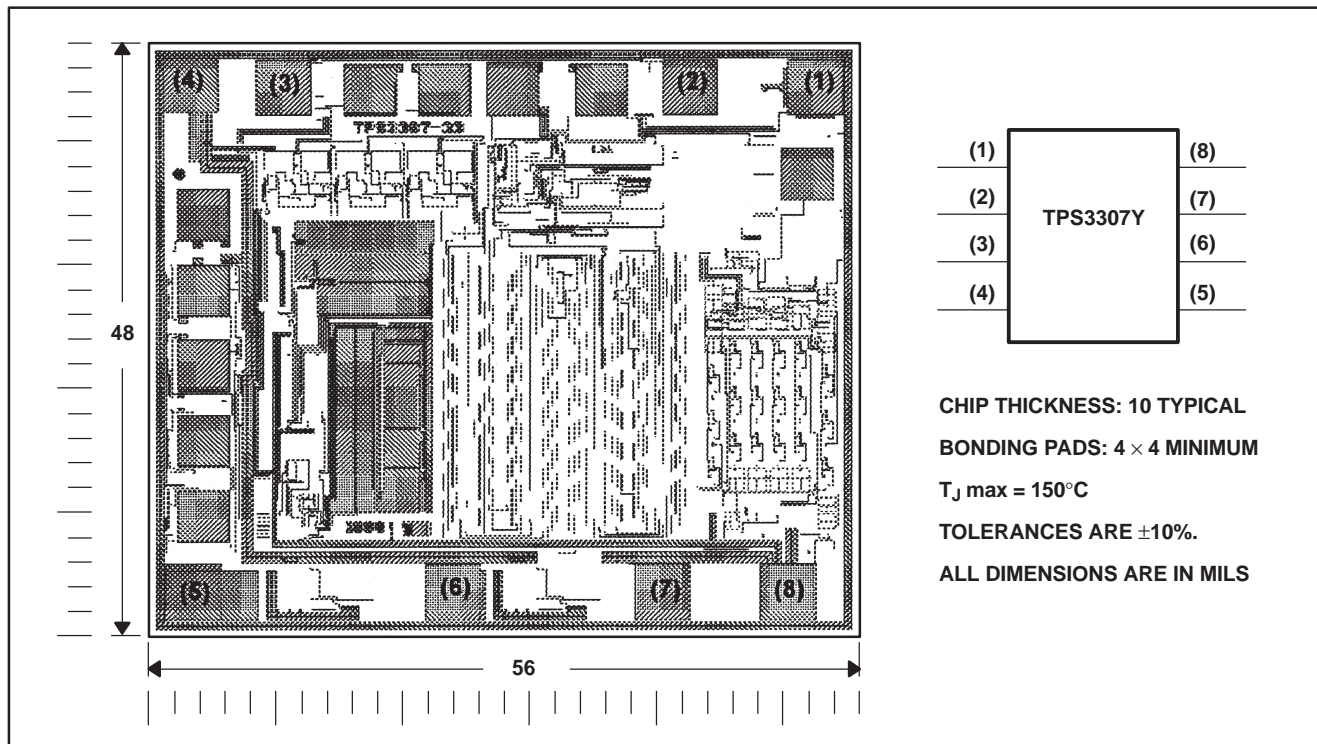


Table 2. Terminal Functions

TERMINAL NAME	NO.	I/O	DESCRIPTION
GND	4		Ground
$\overline{\text{MR}}$	7	I	Manual reset
$\overline{\text{RESET}}$	5	O	Active-low reset output
RESET	6	O	Active-high reset output
SENSE1	1	I	Sense voltage input 1
SENSE2	2	I	Sense voltage input 2
SENSE3	3	I	Sense voltage input 3
V _{DD}	8		Supply voltage

Absolute Maximum Ratings⁽¹⁾

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

	UNIT
Supply voltage, V_{DD} ⁽²⁾	7V
\overline{MR} pin	-0.3V to $V_{DD} + 0.3V$
All other pins ⁽²⁾	-0.3V to 7V
Maximum low output current, I_{OL}	5mA
Maximum high output current, I_{OH}	-5mA
Input clamp current, I_{IK} ($V_I < 0$ or $V_I > V_{DD}$)	$\pm 20mA$
Output clamp current, I_{OK} ($V_O < 0$ or $V_O > V_{DD}$)	$\pm 20mA$
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 7V for more than $t = 1000h$ continuously.

Dissipation Rating Table

PACKAGE	$T_A \leq +25^\circ C$ POWER RATING	DERATING FACTOR ABOVE $T_A = +25^\circ C$	$T_A = +70^\circ C$ POWER RATING	$T_A = +85^\circ C$ POWER RATING
DGN	2.14W	17.1mW/°C	1.37W	1.11W
D	725mW	5.8mW/°C	464mW	377mW

Recommended Operating Conditions

At specified temperature range.

	MIN	MAX	UNIT
Supply voltage, V_{DD}	2	6	V
Input voltage at \overline{MR} and SENSE3, V_I	0	$V_{DD} + 0.3$	V
Input voltage at SENSE1 and SENSE2, V_I	0	$(V_{DD} + 0.3)V_{IT}/1.25V$	V
High-level input voltage at \overline{MR} , V_{IH}	$0.7 \times V_{DD}$		V
Low-level input voltage at \overline{MR} , V_{IL}		$0.3 \times V_{DD}$	V
Input transition rise and fall rate at \overline{MR} , $\Delta t/\Delta V$		50	ns/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	V _{DD} = 2V to 6V, I _{OH} = -20 μA	V _{DD} - 0.2V			V	
		V _{DD} = 3.3V, I _{OH} = -2mA	V _{DD} - 0.4V				
		V _{DD} = 6V, I _{OH} = -3mA	V _{DD} - 0.4V				
V _{OL}	Low-level output voltage	V _{DD} = 2V to 6V, I _{OL} = 20μA	0.2			V	
		V _{DD} = 3.3V, I _{OL} = 2mA	0.4				
		V _{DD} = 6V, I _{OL} = 3mA	0.4				
Power-up reset voltage ⁽¹⁾		V _{DD} ≥ 1.1V, I _{OL} = 20μA	0.4			V	
V _{IT-}	Negative-going input threshold voltage ⁽²⁾	V _{DD} = 2V to 6V, T _A = 0°C to +85°C	VSENSE3	1.22	1.25	1.28	V
			VSENSE1, VSENSE2	1.64	1.68	1.72	
				2.20	2.25	2.30	
				2.86	2.93	3	
		VSENSE3	V _{DD} = 2V to 6V, T _A = -40°C to +85°C	1.22	1.25	1.29	V
				1.64	1.68	1.73	V
				2.20	2.25	2.32	
				2.86	2.93	3.02	
V _{hys}	Hysteresis at VSENSEn input	V _{IT-} = 1.25V	10			mV	
		V _{IT-} = 1.68V	15				
		V _{IT-} = 2.25V	20				
		V _{IT-} = 2.93V	30				
		V _{IT-} = 4.55V	40				
I _H	High-level input current	\overline{MR}	$\overline{MR} = 0.7 \times V_{DD}$, V _{DD} = 6V			μA	
		SENSE1	VSENSE1 = V _{DD} = 6V				
		SENSE2	VSENSE2 = V _{DD} = 6V				
		SENSE3	VSENSE3 = V _{DD}				
I _L	Low-level input current	\overline{MR}	$\overline{MR} = 0V$, V _{DD} = 6V			μA	
		SENSEn	VSENSE1,2,3 = 0V			nA	
I _{DD}	Supply current		40			μA	
C _i	Input capacitance	V _I = 0V to V _{DD}	10			pF	

(1) The lowest supply voltage at which \overline{RESET} becomes active. t_r, V_{DD} ≥ 15μs/V

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

Timing Requirements

At $V_{DD} = 2V$ to $6V$, $R_L = 1M\Omega$, $C_L = 50pF$, $T_A = +25^\circ C$.

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

Switching Characteristics

At $V_{DD} = 2V$ to $6V$, $R_L = 1M\Omega$, $C_L = 50pF$, $T_A = +25^\circ C$.

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_d	Delay time	$V_{I(SENSEn)} \geq V_{IT+} + 0.2V$, $\overline{MR} \geq 0.7 \times V_{DD}$. See Timing Diagram .	140	200	280	ms
t_{PHL}	Propagation (delay) time, high-to-low level output	\overline{MR} to \overline{RESET} \overline{MR} to \overline{RESET}		200	500	ns
t_{PLH}	Propagation (delay) time, low-to-high level output	\overline{MR} to \overline{RESET} \overline{MR} to \overline{RESET}				
t_{PHL}	Propagation (delay) time, high-to-low level output	\overline{SENSEn} to \overline{RESET} \overline{SENSEn} to \overline{RESET}		1	5	μs
t_{PLH}	Propagation (delay) time, low-to-high level output	\overline{SENSEn} to \overline{RESET} \overline{SENSEn} to \overline{RESET}				

Typical Characteristics

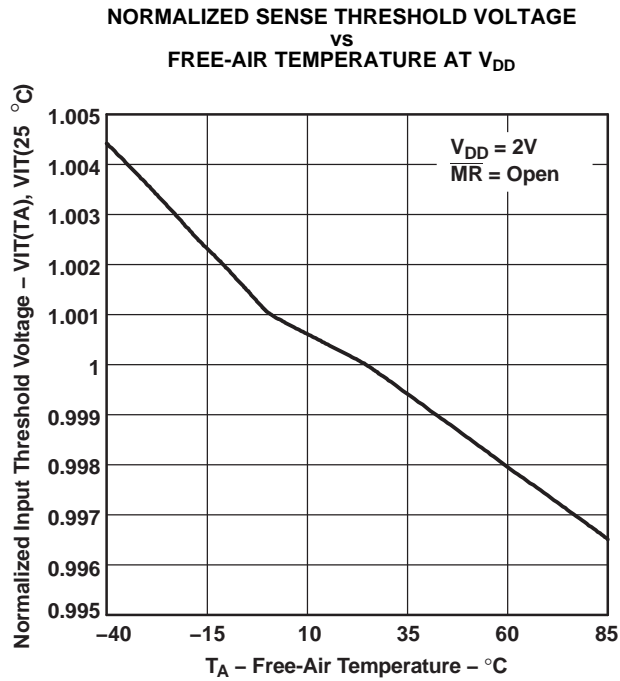


Figure 2.

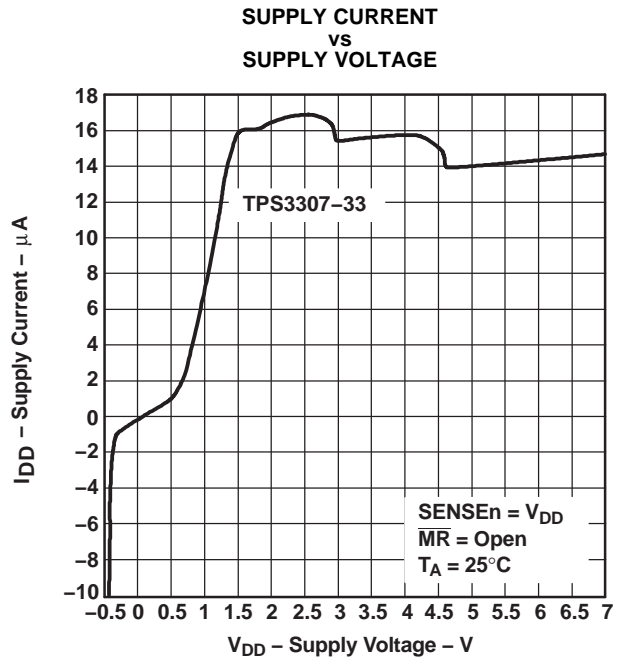


Figure 3.

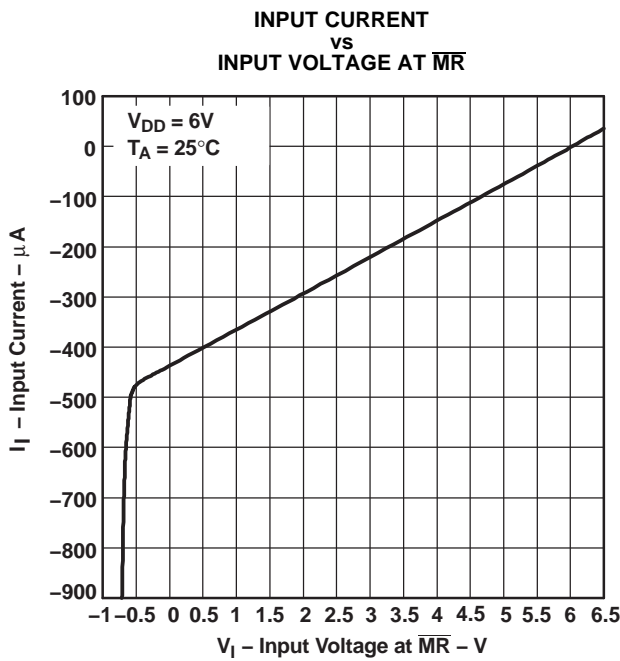


Figure 4.

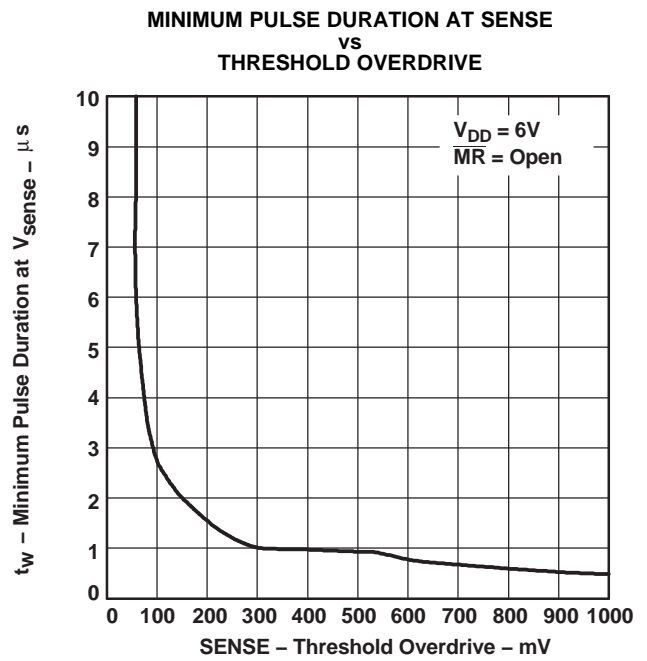


Figure 5.

Typical Characteristics (continued)

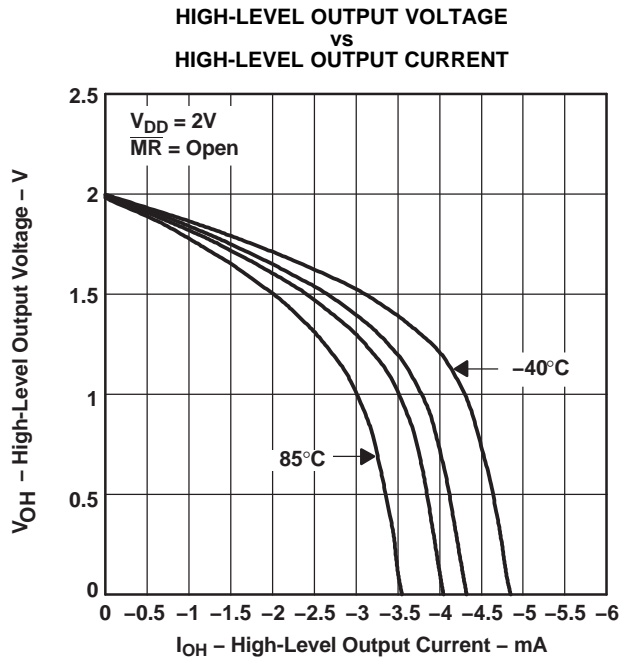


Figure 6.

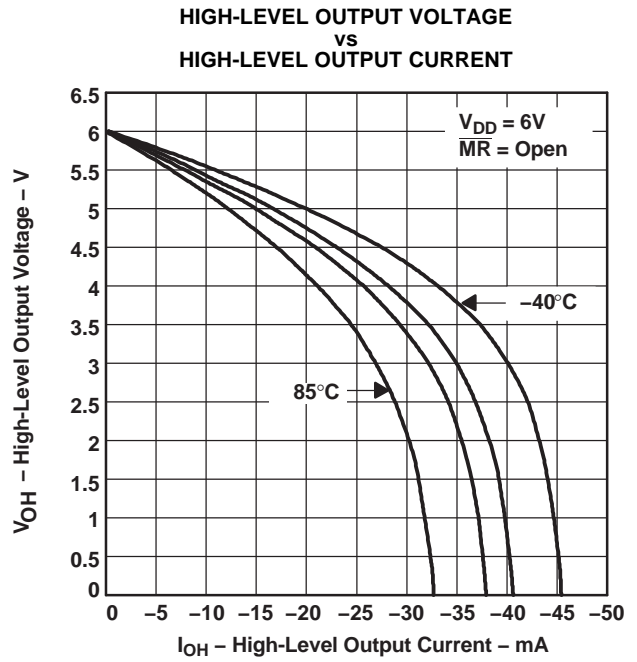


Figure 7.

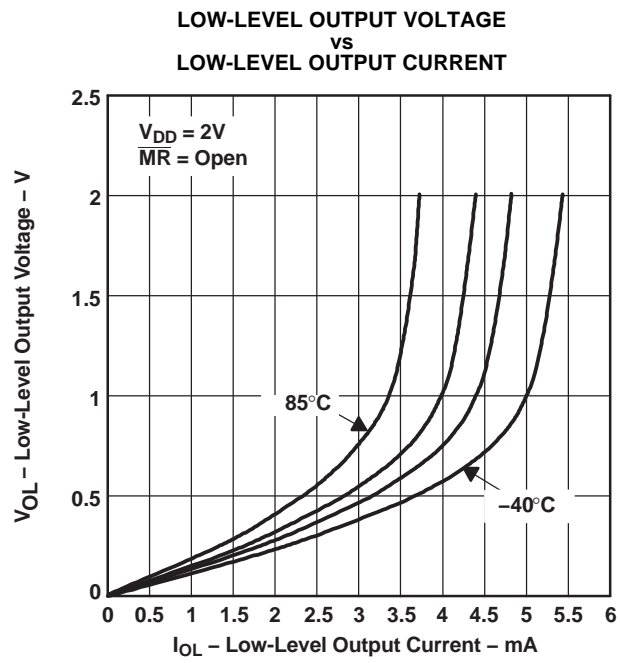


Figure 8.

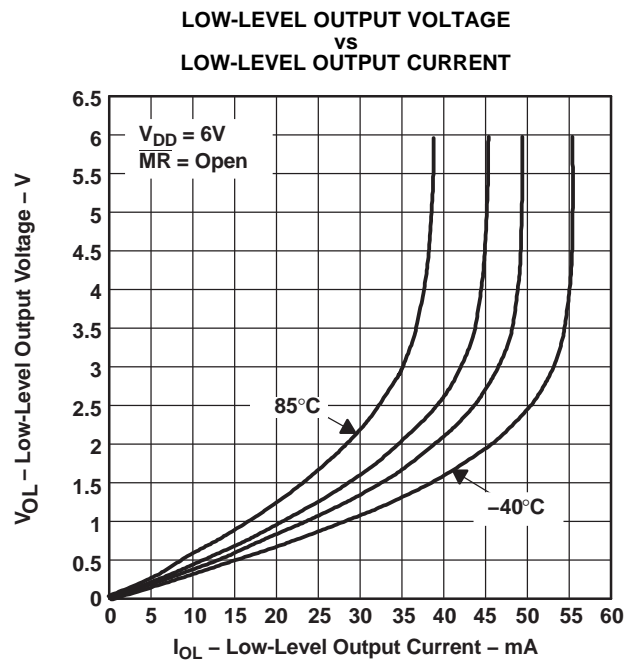


Figure 9.

PACKAGING INFORMATION

Orderable Device	Status ⁽¹⁾	Package Type	Package Drawing	Pins	Package Qty	Eco Plan ⁽²⁾	Lead/ Ball Finish	MSL Peak Temp ⁽³⁾	Samples (Requires Login)
TPS3307-18D	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Request Free Samples
TPS3307-18DG4	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Request Free Samples
TPS3307-18DGN	ACTIVE	MSOP- PowerPAD	DGN	8	80	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Contact TI Distributor or Sales Office
TPS3307-18DGNG4	ACTIVE	MSOP- PowerPAD	DGN	8	80	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Contact TI Distributor or Sales Office
TPS3307-18DGNR	ACTIVE	MSOP- PowerPAD	DGN	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Request Free Samples
TPS3307-18DGNRG4	ACTIVE	MSOP- PowerPAD	DGN	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Request Free Samples
TPS3307-18DR	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Purchase Samples
TPS3307-18DRG4	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Purchase Samples
TPS3307-25D	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Request Free Samples
TPS3307-25DG4	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Request Free Samples
TPS3307-25DGN	ACTIVE	MSOP- PowerPAD	DGN	8	80	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Purchase Samples
TPS3307-25DGNG4	ACTIVE	MSOP- PowerPAD	DGN	8	80	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Purchase Samples
TPS3307-25DGNR	ACTIVE	MSOP- PowerPAD	DGN	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Request Free Samples
TPS3307-25DGNRG4	ACTIVE	MSOP- PowerPAD	DGN	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Request Free Samples
TPS3307-25DR	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Purchase Samples
TPS3307-25DRG4	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Purchase Samples
TPS3307-33D	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Contact TI Distributor or Sales Office

Orderable Device	Status ⁽¹⁾	Package Type	Package Drawing	Pins	Package Qty	Eco Plan ⁽²⁾	Lead/ Ball Finish	MSL Peak Temp ⁽³⁾	Samples (Requires Login)
TPS3307-33DG4	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Contact TI Distributor or Sales Office
TPS3307-33DGN	ACTIVE	MSOP- PowerPAD	DGN	8	80	Green (RoHS & no Sb/Br)	CU NIPDAUAG	Level-1-260C-UNLIM	Contact TI Distributor or Sales Office
TPS3307-33DGNG4	ACTIVE	MSOP- PowerPAD	DGN	8	80	Green (RoHS & no Sb/Br)	CU NIPDAUAG	Level-1-260C-UNLIM	Contact TI Distributor or Sales Office
TPS3307-33DGNR	ACTIVE	MSOP- PowerPAD	DGN	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Request Free Samples
TPS3307-33DGNRG4	ACTIVE	MSOP- PowerPAD	DGN	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Request Free Samples
TPS3307-33DR	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Request Free Samples
TPS3307-33DRG4	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Request Free Samples

⁽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⁾ Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

TBD: The Pb-Free/Green conversion plan has not been defined.

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

Pb-Free (RoHS Exempt): This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

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

Important Information and Disclaimer: The information provided on this page represents TI's knowledge and belief as of the date that it is provided. TI bases its knowledge and belief on information provided by third parties, and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. TI has taken and continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. TI and TI suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.

In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

OTHER QUALIFIED VERSIONS OF TPS3307-18, TPS3307-33 :

- Automotive: [TPS3307-18-Q1](#)
- Enhanced Product: [TPS3307-18-EP](#), [TPS3307-33-EP](#)
- Military: [TPS3307-18M](#)

NOTE: Qualified Version Definitions:

- Automotive - Q100 devices qualified for high-reliability automotive applications targeting zero defects
- Enhanced Product - Supports Defense, Aerospace and Medical Applications
- Military - QML certified for Military and Defense Applications

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
TPS3307-18DGNR	MSOP-Power PAD	DGN	8	2500	330.0	12.4	5.3	3.4	1.4	8.0	12.0	Q1
TPS3307-18DR	SOIC	D	8	2500	330.0	12.4	6.4	5.2	2.1	8.0	12.0	Q1
TPS3307-25DGNR	MSOP-Power PAD	DGN	8	2500	330.0	12.4	5.3	3.4	1.4	8.0	12.0	Q1
TPS3307-25DR	SOIC	D	8	2500	330.0	12.4	6.4	5.2	2.1	8.0	12.0	Q1
TPS3307-33DGNR	MSOP-Power PAD	DGN	8	2500	330.0	12.4	5.3	3.4	1.4	8.0	12.0	Q1
TPS3307-33DR	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)
TPS3307-18DGNR	MSOP-PowerPAD	DGN	8	2500	358.0	335.0	35.0
TPS3307-18DR	SOIC	D	8	2500	346.0	346.0	29.0
TPS3307-25DGNR	MSOP-PowerPAD	DGN	8	2500	358.0	335.0	35.0
TPS3307-25DR	SOIC	D	8	2500	346.0	346.0	29.0
TPS3307-33DGNR	MSOP-PowerPAD	DGN	8	2500	358.0	335.0	35.0
TPS3307-33DR	SOIC	D	8	2500	346.0	346.0	29.0

DGN (S-PDSO-G8)

PowerPAD™ PLASTIC SMALL OUTLINE



- NOTES:
- All linear dimensions are in millimeters.
 - This drawing is subject to change without notice.
 - Body dimensions do not include mold flash or protrusion.
 - This package is designed to be soldered to a thermal pad on the board. Refer to Technical Brief, PowerPad Thermally Enhanced Package, Texas Instruments Literature No. SLMA002 for information regarding recommended board layout. This document is available at www.ti.com <<http://www.ti.com>>.
 - See the additional figure in the Product Data Sheet for details regarding the exposed thermal pad features and dimensions.
 - Falls within JEDEC MO-187 variation AA-T

PowerPAD is a trademark of Texas Instruments.

THERMAL PAD MECHANICAL DATA

DGN (S-PDSO-G8)

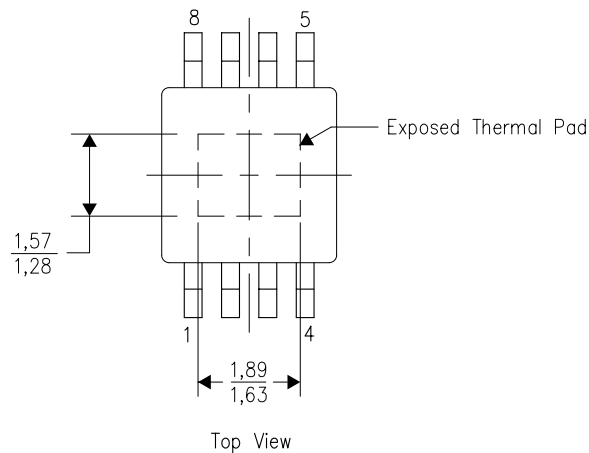
PowerPAD™ PLASTIC SMALL OUTLINE

THERMAL INFORMATION

This PowerPAD™ package incorporates an exposed thermal pad that is designed to be attached to a printed circuit board (PCB). The thermal pad must be soldered directly to the PCB. After soldering, the PCB can be used as a heatsink. In addition, through the use of thermal vias, the thermal pad can be attached directly to the appropriate copper plane shown in the electrical schematic for the device, or alternatively, can be attached to a special heatsink structure designed into the PCB. This design optimizes the heat transfer from the integrated circuit (IC).

For additional information on the PowerPAD package and how to take advantage of its heat dissipating abilities, refer to Technical Brief, PowerPAD Thermally Enhanced Package, Texas Instruments Literature No. SLMA002 and Application Brief, PowerPAD Made Easy, Texas Instruments Literature No. SLMA004. Both documents are available at www.ti.com.

The exposed thermal pad dimensions for this package are shown in the following illustration.

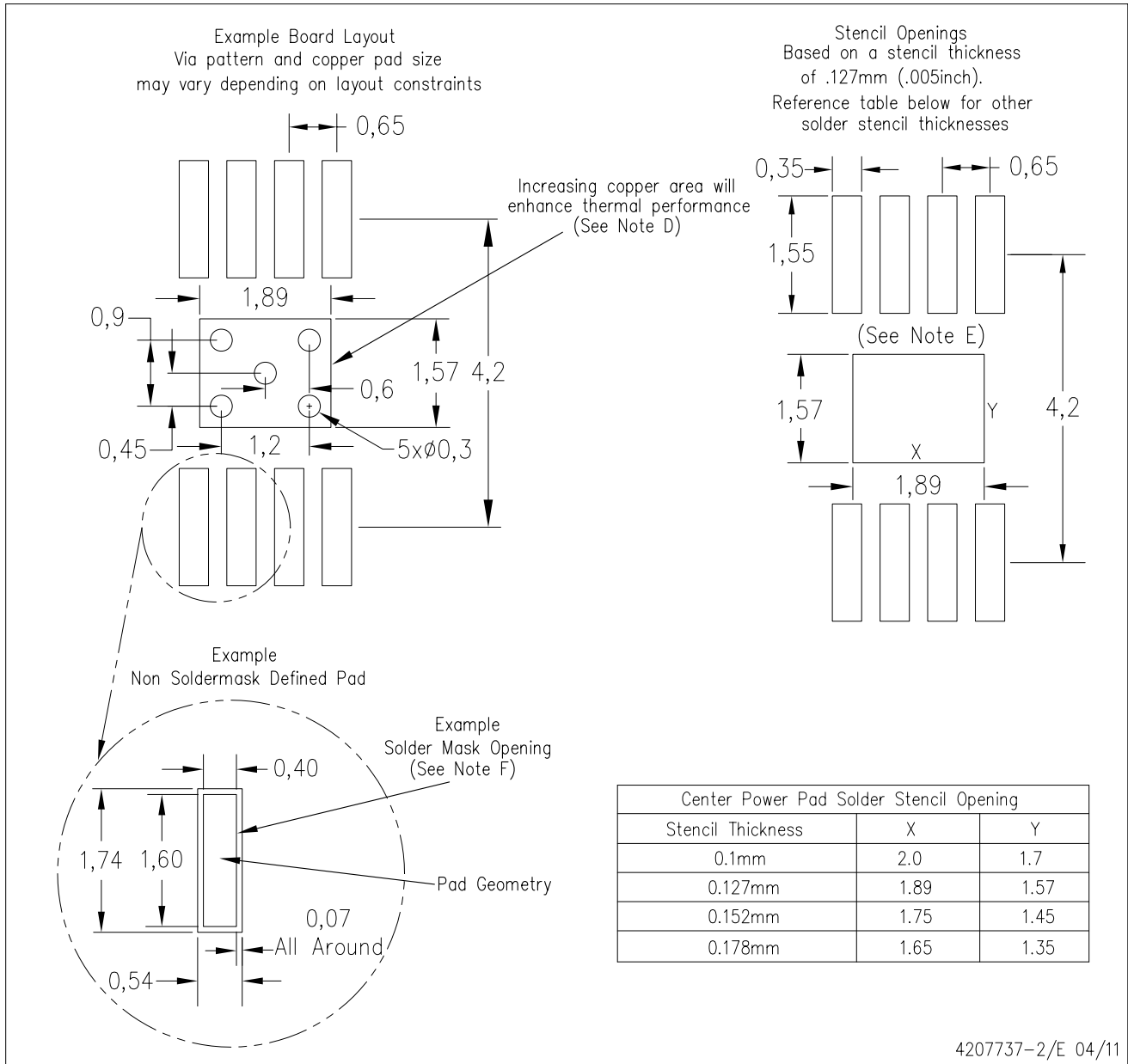


Exposed Thermal Pad Dimensions

4206323-2/H 05/11

NOTE: All linear dimensions are in millimeters

PowerPAD is a trademark of Texas Instruments



- NOTES:
- A. All linear dimensions are in millimeters.
 - B. This drawing is subject to change without notice.
 - C. Customers should place a note on the circuit board fabrication drawing not to alter the center solder mask defined pad.
 - D. This package is designed to be soldered to a thermal pad on the board. Refer to Technical Brief, PowerPad Thermally Enhanced Package, Texas Instruments Literature No. SLMA002, SLMA004, and also the Product Data Sheets for specific thermal information, via requirements, and recommended board layout. These documents are available at www.ti.com <<http://www.ti.com>>. Publication IPC-7351 is recommended for alternate designs.
 - E. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Example stencil design based on a 50% volumetric metal load solder paste. Refer to IPC-7525 for other stencil recommendations.
 - F. Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.

PowerPAD is a trademark of Texas Instruments

D (R-PDSO-G8)

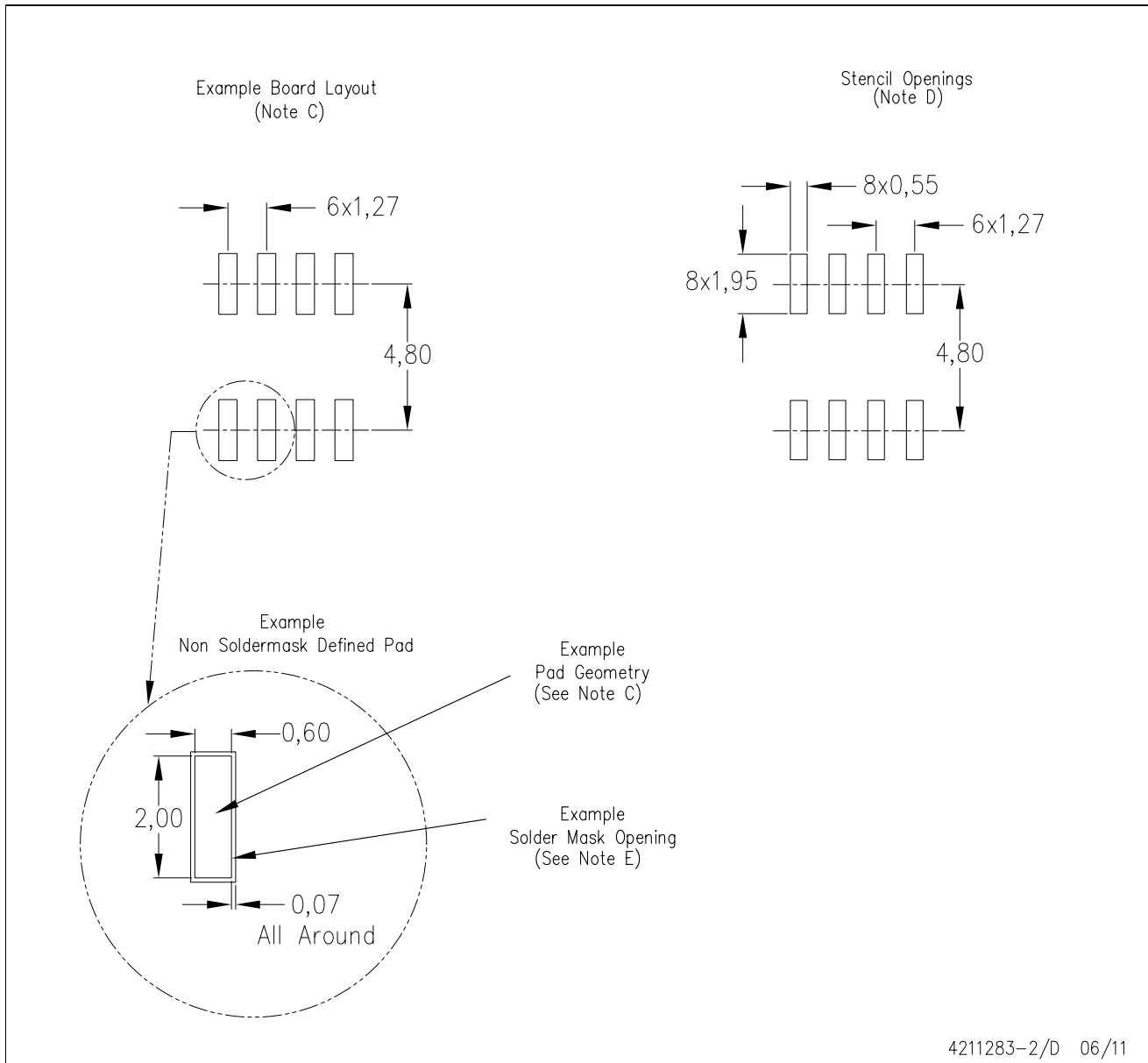
PLASTIC SMALL OUTLINE



- NOTES:
- A. All linear dimensions are in inches (millimeters).
 - B. This drawing is subject to change without notice.
 - C. Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.006 (0,15) each side.
 - D. Body width does not include interlead flash. Interlead flash shall not exceed 0.017 (0,43) each side.
 - E. Reference JEDEC MS-012 variation AA.

D (R-PDSO-G8)

PLASTIC SMALL OUTLINE



- NOTES:
- All linear dimensions are in millimeters.
 - This drawing is subject to change without notice.
 - Publication IPC-7351 is recommended for alternate designs.
 - Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Refer to IPC-7525 for other stencil recommendations.
 - Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.

IMPORTANT NOTICE

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

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

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

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

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

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

TI products are not authorized for use in safety-critical applications (such as life support) where a failure of the TI product would reasonably be expected to cause severe personal injury or death, unless officers of the parties have executed an agreement specifically governing such use. Buyers represent that they have all necessary expertise in the safety and regulatory ramifications of their applications, and acknowledge and agree that they are solely responsible for all legal, regulatory and safety-related requirements concerning their products and any use of TI products in such safety-critical applications, notwithstanding any applications-related information or support that may be provided by TI. Further, Buyers must fully indemnify TI and its representatives against any damages arising out of the use of TI products in such safety-critical applications.

TI products are neither designed nor intended for use in military/aerospace applications or environments unless the TI products are specifically designated by TI as military-grade or "enhanced plastic." Only products designated by TI as military-grade meet military specifications. Buyers acknowledge and agree that any such use of TI products which TI has not designated as military-grade is solely at the Buyer's risk, and that they are solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI products are neither designed nor intended for use in automotive applications or environments unless the specific TI products are designated by TI as compliant with ISO/TS 16949 requirements. Buyers acknowledge and agree that, if they use any non-designated products in automotive applications, TI will not be responsible for any failure to meet such requirements.

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

Products

Audio	www.ti.com/audio
Amplifiers	amplifier.ti.com
Data Converters	dataconverter.ti.com
DLP® Products	www.dlp.com
DSP	dsp.ti.com
Clocks and Timers	www.ti.com/clocks
Interface	interface.ti.com
Logic	logic.ti.com
Power Mgmt	power.ti.com
Microcontrollers	microcontroller.ti.com
RFID	www.ti-rfid.com
RF/IF and ZigBee® Solutions	www.ti.com/lprf

Applications

Communications and Telecom	www.ti.com/communications
Computers and Peripherals	www.ti.com/computers
Consumer Electronics	www.ti.com/consumer-apps
Energy and Lighting	www.ti.com/energy
Industrial	www.ti.com/industrial
Medical	www.ti.com/medical
Security	www.ti.com/security
Space, Avionics and Defense	www.ti.com/space-avionics-defense
Transportation and Automotive	www.ti.com/automotive
Video and Imaging	www.ti.com/video
Wireless	www.ti.com/wireless-apps

TI E2E Community Home Page

e2e.ti.com

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265
Copyright © 2011, Texas Instruments Incorporated