

TPS22958 5.5-V, 4-A / 6-A, 14-mΩ On-Resistance Load Switch with Controlled Turn On

1 Features

- Integrated N-Channel Load Switch
- Input Voltage Range: 0.6 V to 5.5 V
- VBIAS Voltage Range: 2.5 V to 5.5 V
 - Ideal for 1S Battery Configuration
- Low R_{ON} Resistance
 - $R_{ON} = 15\text{ m}\Omega$ at $V_{IN} = 5\text{ V}$ ($V_{BIAS} = 5\text{ V}$)
 - $R_{ON} = 14\text{ m}\Omega$ at $V_{IN} = 3.3\text{ V}$ ($V_{BIAS} = 5\text{ V}$)
 - $R_{ON} = 14\text{ m}\Omega$ at $V_{IN} = 1.8\text{ V}$ ($V_{BIAS} = 5\text{ V}$)
- 4 A Maximum Continuous Switch Current (DGK Package)
- 6 A Maximum Continuous Switch Current (DGN Package)
- Low Quiescent Current
 - $55\text{ }\mu\text{A}$ at $V_{BIAS} = 5\text{ V}$
- Low Control Input Threshold Enables Use of 1.2 V/1.8 V/2.5 V/3.3 V Logic
- Configurable Rise Time⁽¹⁾
- Quick Output Discharge (QOD)⁽²⁾
- DGK 8-Pin Package:
 - 3.0mm x 4.9mm x 1.1mm and 0.65mm pitch
- DGN 8-Pin Package with Thermal Pad:
 - 3.0mm x 4.9mm x 1.1mm and 0.65mm pitch
- ESD Performance Tested per JEDEC STD.
 - 2 kV HBM and 1 kV CDM
- Latch-Up Performance Exceeds 100 mA per JESD 78, Class II
- GPIO Enable – Active High

⁽¹⁾ See Application Information section for CT value vs. rise time

⁽²⁾ Not available for the TPS22958N device.

2 Applications

- EPOS
- Factory Automation/Control
- Building Automation
- Printers
- Prototype boards
- Wave Soldering Manufacturing

3 Description

The TPS22958 is a small, low R_{ON} , single channel load switch with a controlled slew rate. The device contains an N-Channel MOSFET that can operate over an input voltage range of 0.6 V to 5.5 V and can support a maximum continuous current of 4 A (DGK package) or 6 A (DGN package). The switch is controlled by an on/off input, which is capable of interfacing directly with low voltage control signals.

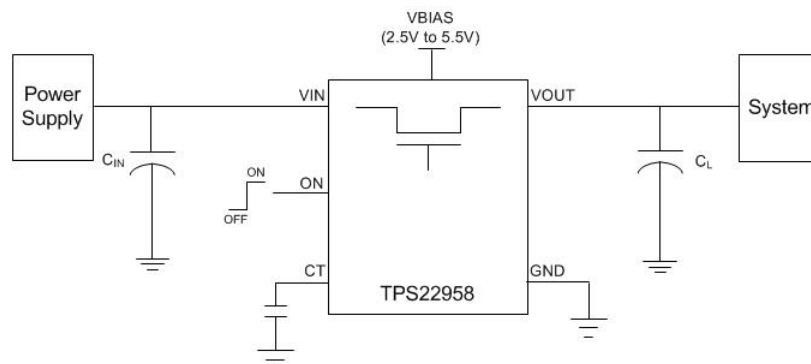
The rise time (slew rate) of the device can be externally controlled in order to avoid inrush current. Attaching a capacitor to the CT pin will cause the rise time to increase: the larger the capacitor, the slower the rise time. The TPS22958 is available in two space-saving packages (DGK and DGN) with or without a thermal pad for high power dissipation. The device is characterized for operation over the free-air temperature range of -40°C to 105°C .

Device Information⁽¹⁾

PART NUMBER	PACKAGE (PIN)	BODY SIZE (NOM)
TPS22958	DGK (8)	3.00 mm x 4.90 mm
	DGN (8)	3.00 mm x 4.90 mm

⁽¹⁾ For all available packages, see the orderable addendum at the end of the data sheet.

Typical Application Schematic



4 Device and Documentation Support

4.1 Trademarks

All trademarks are the property of their respective owners.

4.2 Electrostatic Discharge Caution



These devices have limited built-in ESD protection. The leads should be shorted together or the device placed in conductive foam during storage or handling to prevent electrostatic damage to the MOS gates.

4.3 Glossary

[SLYZ022](#) — *TI Glossary*.

This glossary lists and explains terms, acronyms, and definitions.

5 Mechanical, Packaging, and Orderable Information

The following pages include mechanical, packaging, and orderable information. This information is the most current data available for the designated devices. This data is subject to change without notice and revision of this document. For browser-based versions of this data sheet, refer to the left-hand navigation.

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
TPS22958DGKR	PREVIEW	VSSOP	DGK	8	2500	TBD	Call TI	Call TI	-40 to 105	ZBUX	
TPS22958DGKT	PREVIEW	VSSOP	DGK	8	250	TBD	Call TI	Call TI	-40 to 105	ZBUX	
TPS22958DGNR	PREVIEW	MSOP- PowerPAD	DGN	8	2500	TBD	Call TI	Call TI	-40 to 105	ZBVX	
TPS22958DGNT	PREVIEW	MSOP- PowerPAD	DGN	8	250	TBD	Call TI	Call TI	-40 to 105	ZBVX	
TPS22958NDGKR	PREVIEW	VSSOP	DGK	8	2500	TBD	Call TI	Call TI	-40 to 105		
TPS22958NDGKT	PREVIEW	VSSOP	DGK	8	250	TBD	Call TI	Call TI	-40 to 105		
TPS22958NDGNR	PREVIEW	MSOP- PowerPAD	DGN	8	2500	TBD	Call TI	Call TI	-40 to 105		
TPS22958NDGNT	PREVIEW	MSOP- PowerPAD	DGN	8	250	TBD	Call TI	Call TI	-40 to 105		

(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.

OBSELETE: 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.

(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.

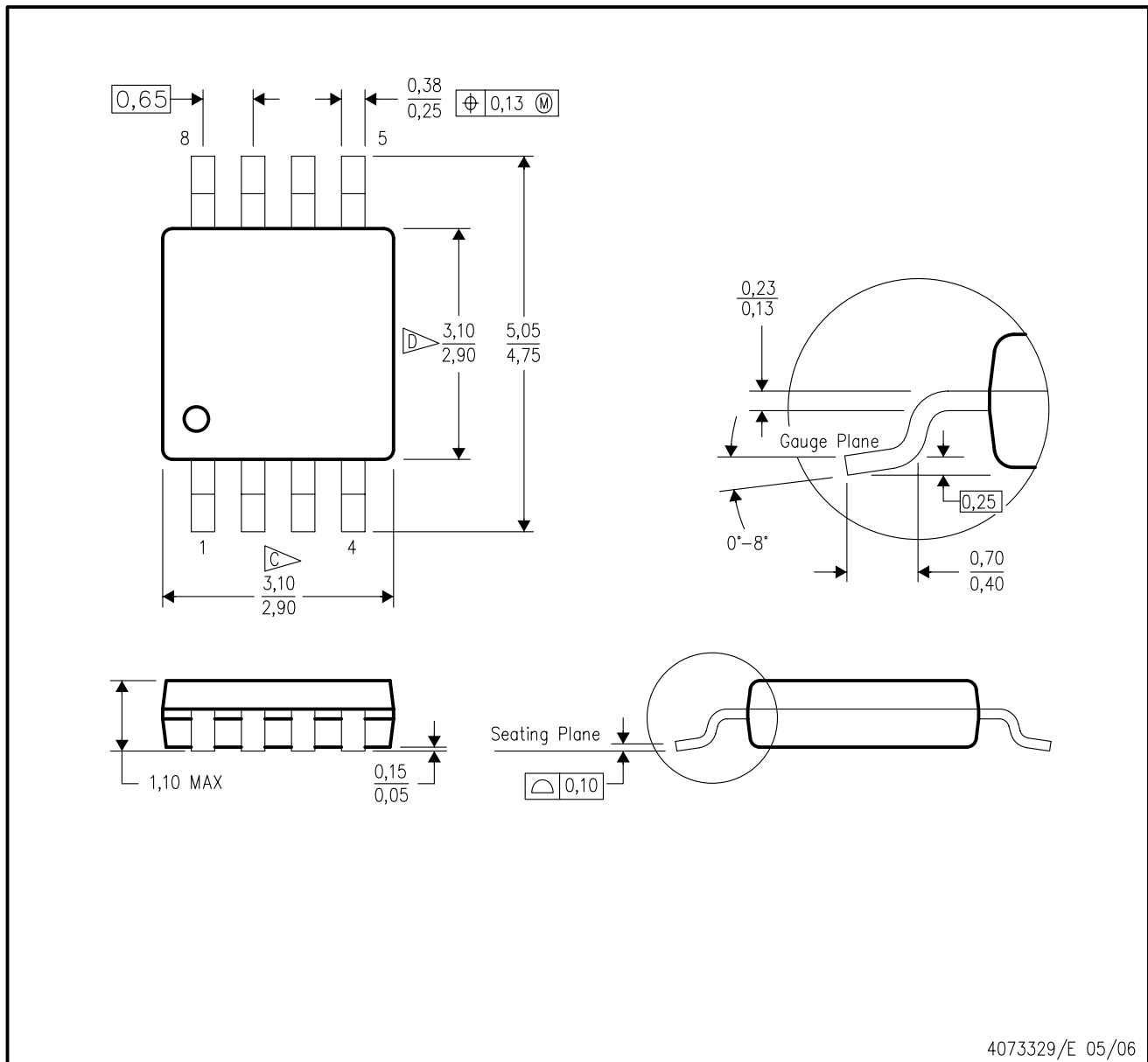
⁽⁶⁾ Lead/Ball Finish - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead/Ball Finish values may wrap to two lines if the finish value exceeds the maximum column width.

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DGK (S-PDSO-G8)

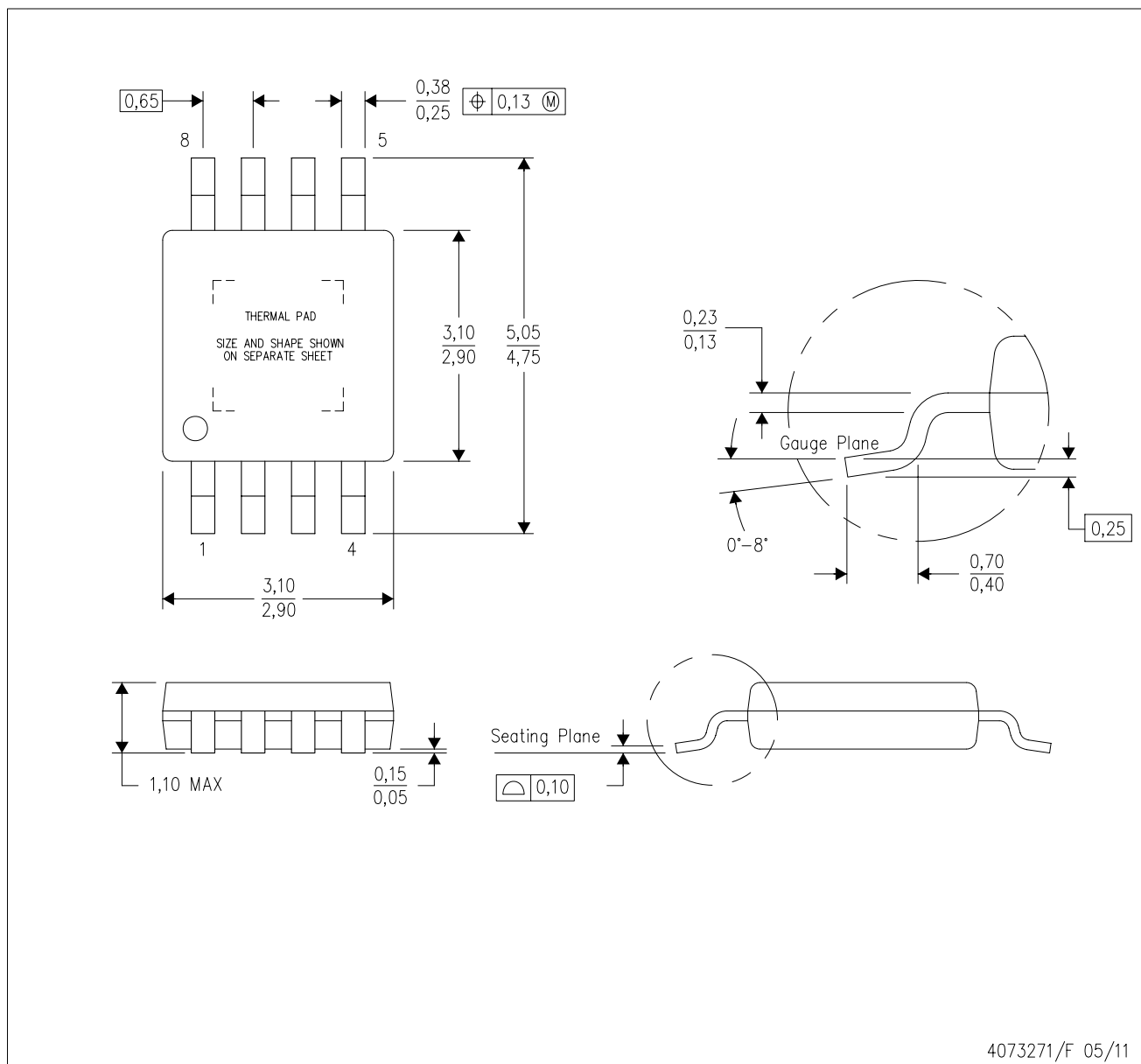
PLASTIC SMALL-OUTLINE PACKAGE



- NOTES:
- A. All linear dimensions are in 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 0.15 per end.
 - D. Body width does not include interlead flash. Interlead flash shall not exceed 0.50 per side.
 - E. Falls within JEDEC MO-187 variation AA, except interlead flash.

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.

DGN (S-PDSO-G8)

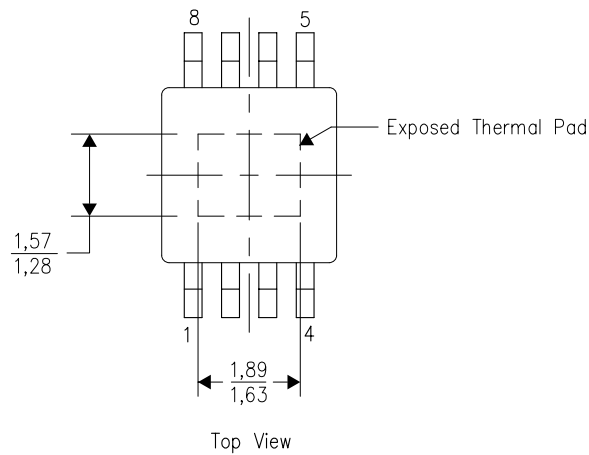
PowerPAD™ PLASTIC SMALL OUTLINE

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.

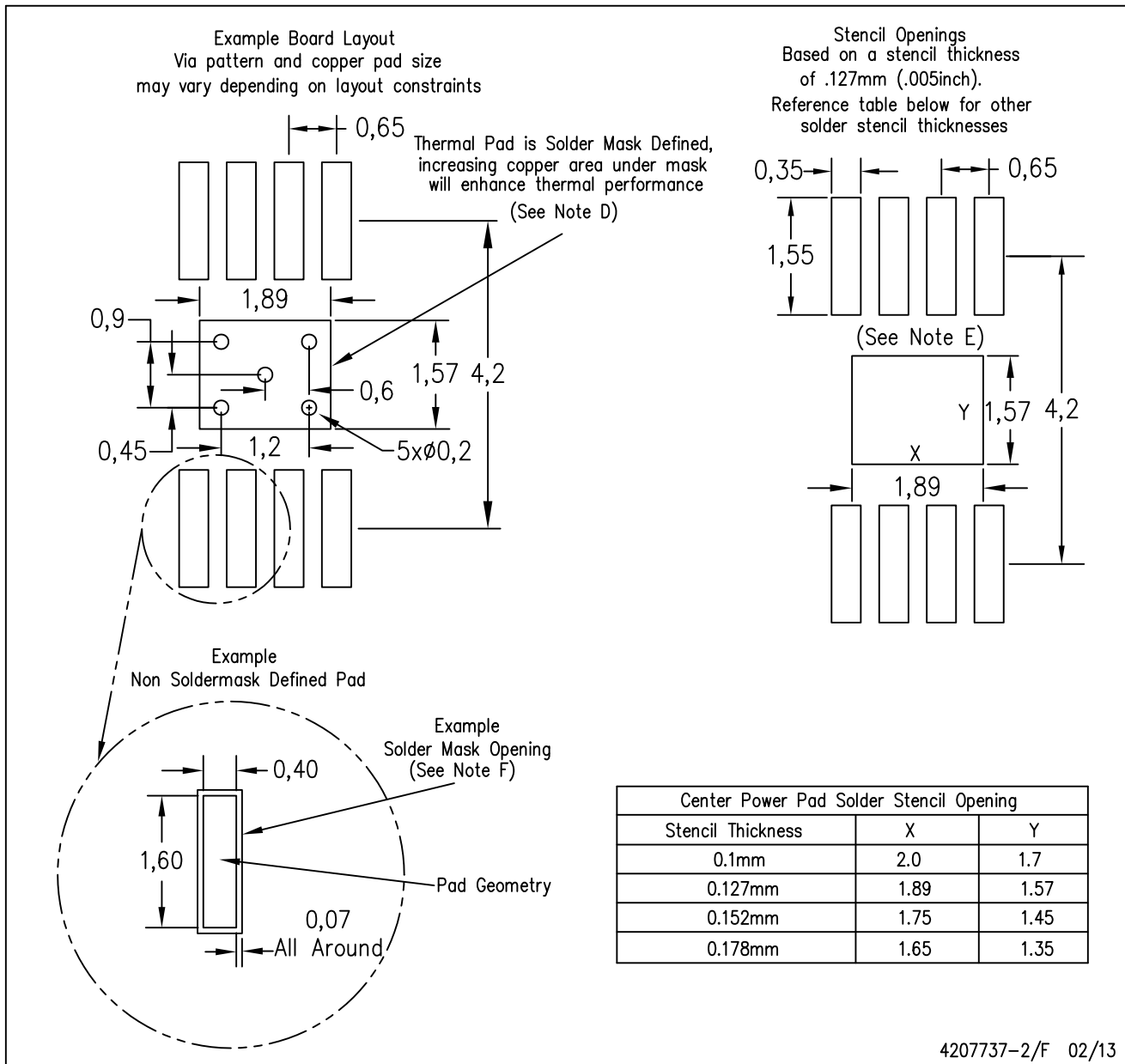


Exposed Thermal Pad Dimensions

4206323-2/1 12/11

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>>.
 - 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

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