

TPS4H000-Q1 40-V/1000-mΩ Quad Channels Smart High-Side Power Switch

1 Features

- Qualified for Automotive Applications
- AEC-Q100 Qualified With the Following Results:
 - Device Temperature Grade 1: -40°C to 125°C
 - Ambient Operating Temperature Range
 - Device HBM ESD Classification Level H3A
 - Device CDM ESD Classification Level C4B
- Quad-Channels 1000-mΩ Smart High-Side Power Switch With Full Diagnostics
 - Version A: Open-Drain Status Output
 - Version B: Current Sense Analog Output
- Wide Operating Voltage 3.4 to 40 V
- Very-Low Standby Current, $< 500\text{ nA}$
- High Accurate Current Sense:
 - $\pm 3\text{ mA}$ when $> 100\text{ mA}$, $\pm 0.5\text{ mA}$ when $> 1\text{ mA}$
- Programmable Current Limit With External Resistor
 - $\pm 15\%$ when $> 50\text{ mA}$
- Protection
 - Short to GND Protection by Current Limit (Internal or External)
 - Thermal Shutdown With Latch Off Option and Thermal Swing
 - Inductive Load Negative Voltage Clamp With Optimized Slew Rate
 - Loss of GND and Loss of Battery Protection

Diagnostic

- Overcurrent and Short to Ground Detection
- Open Load / Short to Battery Detection in On / Off State
- Global Fault for Fast Hardware Interrupt Report
- Certification of ISO7637-2 and ISO16750-2
- 20-Pin Thermally-Enhanced PWP Package

2 Applications

- Multi-CHs LED Drivers
- Multi-CHs High-Side Power Switches
- Multi-CHs High-Side Relay Drivers

3 Description

The TPS4H000-Q1 family is a fully-protected quad channels smart high-side power switch, with integrated 1000-mΩ NMOS power FET.

Full diagnostics and high accuracy current sense features enable intelligent control of the load.

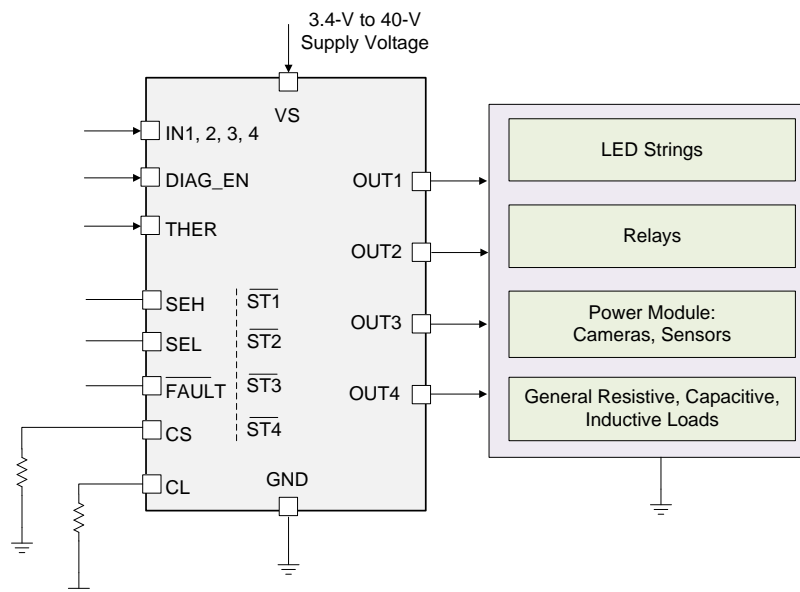
External programmable current limit improves the whole system's reliability by limit the inrush or overload current.

Device Information⁽¹⁾

PART NUMBER	PACKAGE	CHANNELS
TPS4H000-Q1	HTSSOP (20)	4

(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 Community Resources

The following links connect to TI community resources. Linked contents are provided "AS IS" by the respective contributors. They do not constitute TI specifications and do not necessarily reflect TI's views; see TI's [Terms of Use](#).

TI E2E™ Online Community *TI's Engineer-to-Engineer (E2E) Community*. Created to foster collaboration among engineers. At e2e.ti.com, you can ask questions, share knowledge, explore ideas and help solve problems with fellow engineers.

Design Support *TI's Design Support* Quickly find helpful E2E forums along with design support tools and contact information for technical support.

4.2 Trademarks

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4.3 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.

4.4 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
TPS4H000AQPWPRQ1	PREVIEW	HTSSOP	PWP	20	2000	TBD	Call TI	Call TI	-40 to 125		
TPS4H000BQPWPRQ1	PREVIEW	HTSSOP	PWP	20	2000	TBD	Call TI	Call TI	-40 to 125		

(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.

(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.

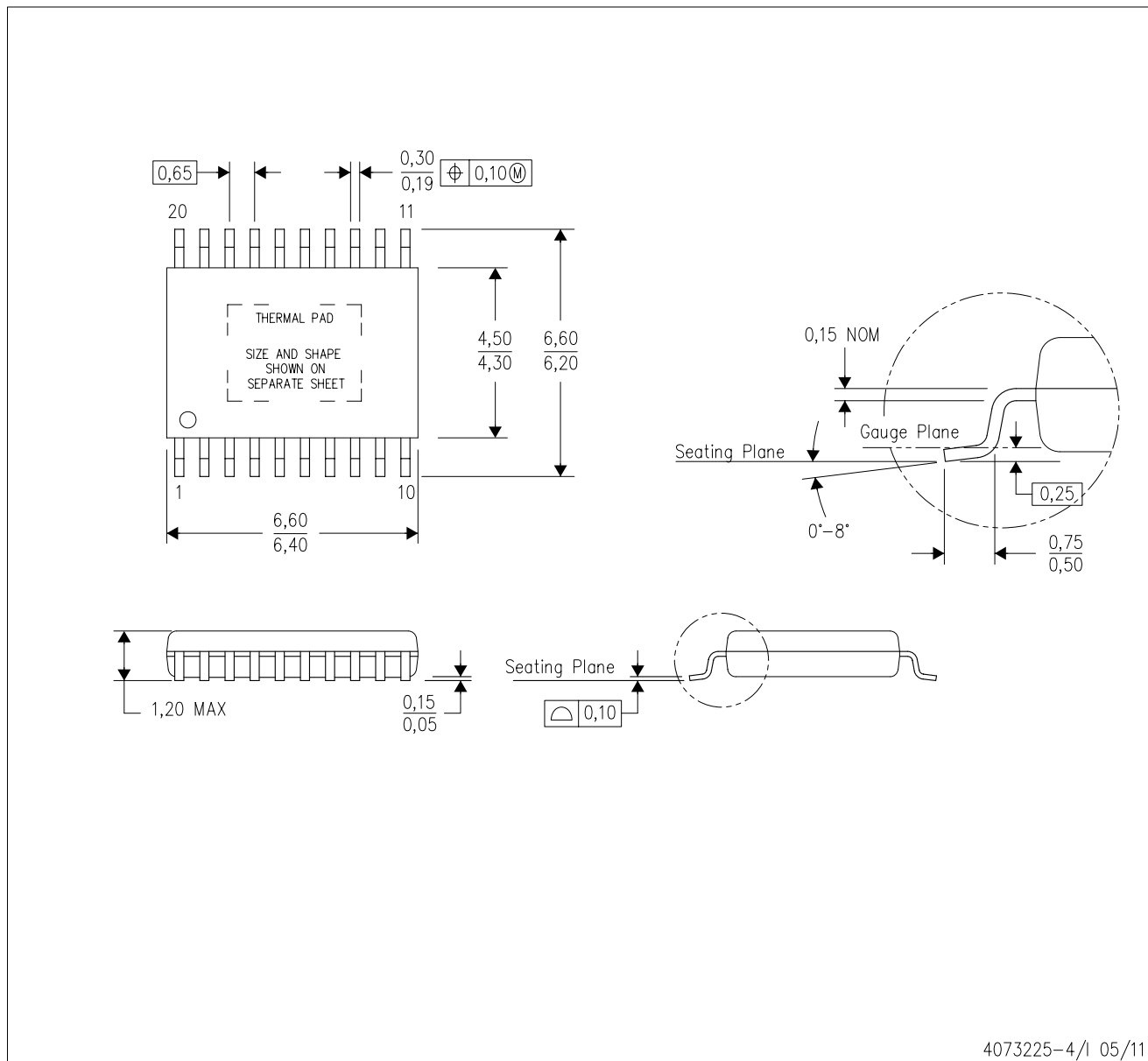
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MECHANICAL DATA

PWP (R-PDSO-G20)

PowerPAD™ PLASTIC SMALL OUTLINE



4073225-4/1 05/11

- NOTES:
- All linear dimensions are in millimeters.
 - This drawing is subject to change without notice.
 - Body dimensions do not include mold flash or protrusions. Mold flash and protrusion shall not exceed 0.15 per side.
 - 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-153

PowerPAD is a trademark of Texas Instruments.

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