



TPS2HB16-Q1 40-V, 16-m Ω Dual-Channel Smart High-Side 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 2
 - Device CDM ESD Classification Level C4B
- Dual-Channel Smart High-Side Switch
- Rated for up to 40-V Load Dump
- 16-m Ω Typical R_{ON} at T_J = 25°C
- Analog Sense Output:
 - Load Current
- High-Accuracy Load Current Sense
- Fault Indication Through SNS Pin
- Open Load and Short-to-Battery Detection
- Protection Capabilities:
 - Thermal Shutdown and Retry
 - Battery Overvoltage and Load Dump
 - VOUT Short-to-Ground
 - Automatic Switch On With Reverse Battery
 - Undervoltage Lockout
 - Loss of Battery
 - Automatic Switch Off With Loss of Ground
 - Output Clamp for Inductive Load

2 Applications

- Body Control Modules
- Incandescent and LED Lighting
- Heating Elements
- Transmission Control Unit
- Climate Control

3 Description

The TPS2HB16-Q1 device is a dual-channel smart high-side switch intended for use with 12-V automotive batteries. The device integrates many protection and diagnostic features.

The device provides a high-accuracy analog current sense that enables improved diagnostics of complex loads (such as multiple parallel loads driven by the same switch).

The device operates with an input voltage down to 3 V (with respect to the GND pin of the device). This input voltage allows for continued operation during cold crank.

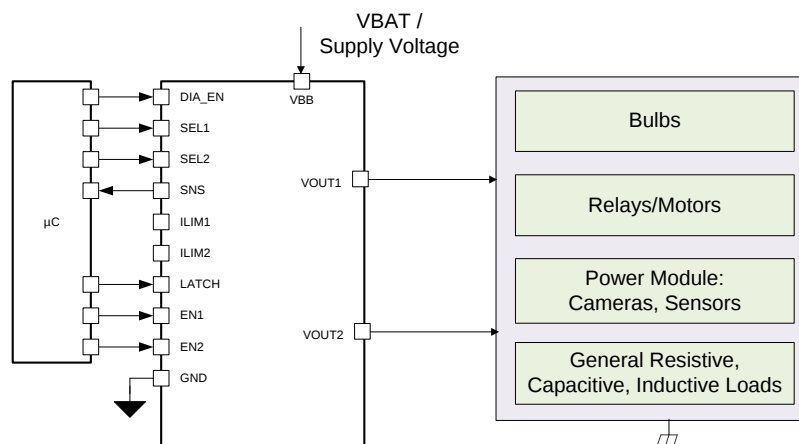
The TPS2HB16-Q1 device is available in a small 16-pin HTSSOP package for a reduced PCB footprint.

Device Information⁽¹⁾

PART NUMBER	PACKAGE	BODY SIZE (NOM)
TPS2HB16-Q1	HTSSOP (16)	5.00 mm × 4.40 mm

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

Simplified Schematic



4 Device and Documentation Support

4.1 Device Support

4.1.1 Device Options

Table 1 shows device options that are programmed during manufacturing of the device. The option that best fits the application should be selected.

Table 1. Device Options

CURRENT LIMIT	REACTION TO REACHING CURRENT LIMIT	VERSION CHARACTER	FULL PART NUMBER
Resistor Programmable	Disable switch immediately	B	TPS2HB16BQPWPRQ1
Resistor Programmable	Keep switch enabled; Limit the current	D	TPS2HB16DQPWPRQ1
Not Programmable	Disable switch immediately	F	TPS2HB16FQPWPRQ1

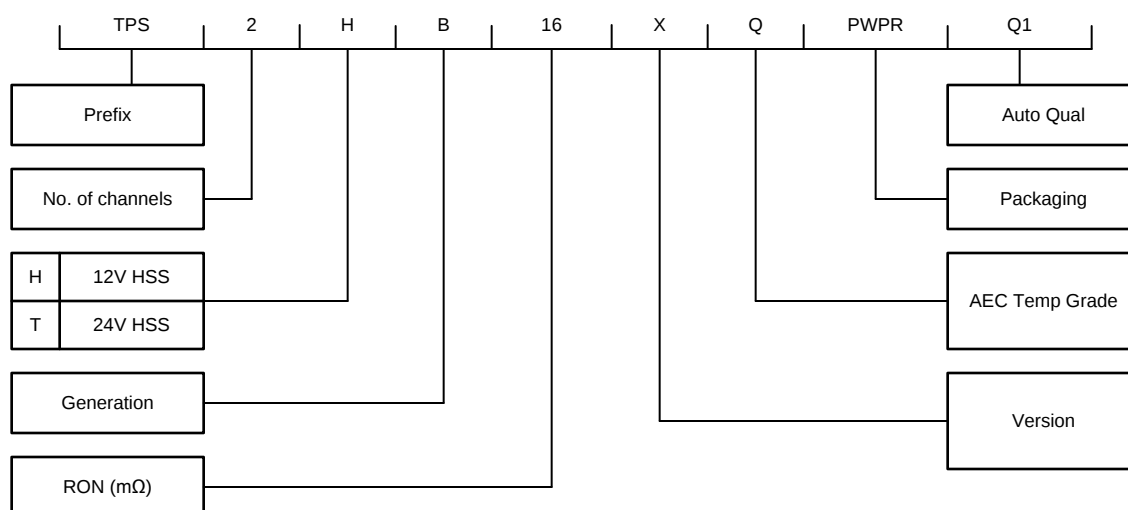


Figure 1. Naming Convention

4.2 Documentation Support

4.3 Receiving Notification of Documentation Updates

To receive notification of documentation updates, navigate to the device product folder on ti.com. In the upper right corner, click on *Alert me* to register and receive a weekly digest of any product information that has changed. For change details, review the revision history included in any revised document.

4.4 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.

4.5 Trademarks

E2E is a trademark of Texas Instruments.
All other trademarks are the property of their respective owners.

4.6 Electrostatic Discharge Caution



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.

4.7 Glossary

[SLYZ022](#) — *TI Glossary*.

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

5 Mechanical, Packaging, and Orderable Information

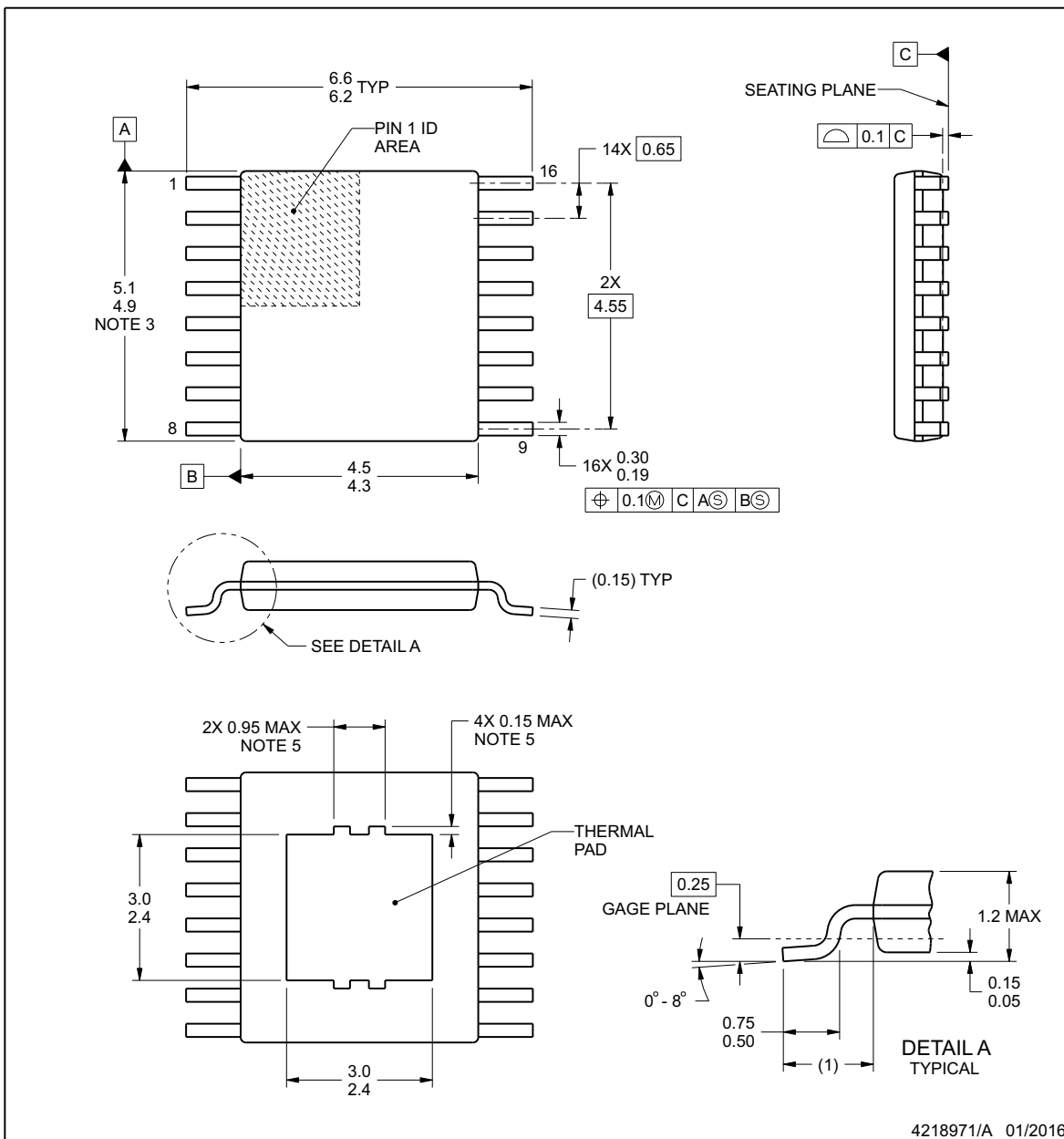
The following pages include mechanical, packaging, and orderable information. This information is the most current data available for the designated devices. This data is subject to change without notice and revision of this document. For browser-based versions of this data sheet, refer to the left-hand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



PACKAGE OUTLINE

PWP0016B
PowerPAD™ TSSOP - 1.2 mm max height

PLASTIC SMALL OUTLINE



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NOTES:

PowerPAD is a trademark of Texas Instruments.

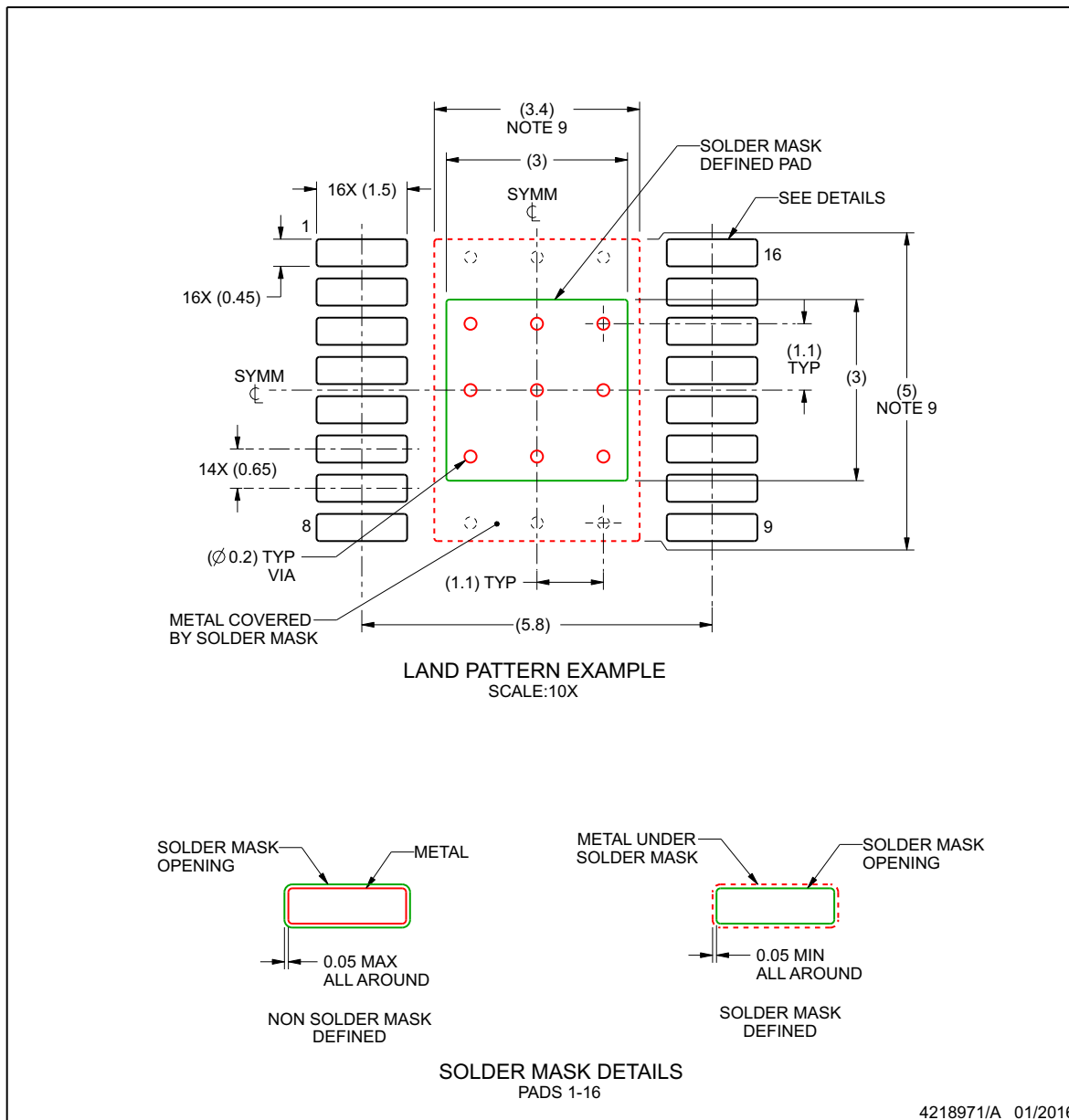
1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 mm per side.
4. Reference JEDEC registration MO-153.
5. Features may not be present.

EXAMPLE BOARD LAYOUT

PWP0016B

PowerPAD™ TSSOP - 1.2 mm max height

PLASTIC SMALL OUTLINE



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. This package is designed to be soldered to a thermal pad on the board. For more information, see Texas Instruments literature numbers SLMA002 (www.ti.com/lit/slma002) and SLMA004 (www.ti.com/lit/slma004).
9. Size of metal pad may vary due to creepage requirement.

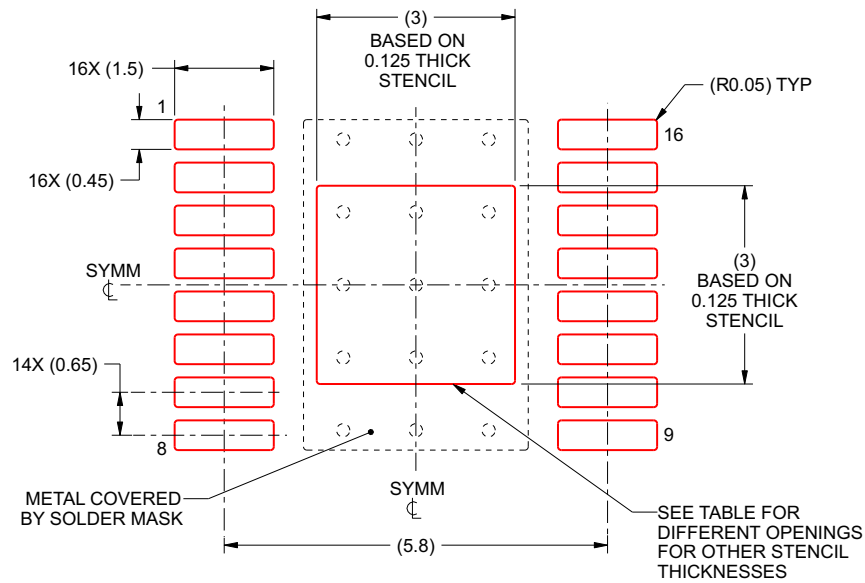
ADVANCE INFORMATION

EXAMPLE STENCIL DESIGN

PWP0016B

PowerPAD™ TSSOP - 1.2 mm max height

PLASTIC SMALL OUTLINE



SOLDER PASTE EXAMPLE
EXPOSED PAD
100% PRINTED SOLDER COVERAGE BY AREA
SCALE:10X

STENCIL THICKNESS	SOLDER STENCIL OPENING
0.1	3.35 X 3.35
0.125	3 X 3 (SHOWN)
0.15	2.74 X 2.74
0.175	2.54 X 2.54

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NOTES: (continued)

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

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
PTPS2HB16DQPWPRQ1	ACTIVE	HTSSOP	PWP	16	2000	TBD	Call TI	Call TI	-40 to 125		Samples
PTPS2HB16FQPWPRQ1	ACTIVE	HTSSOP	PWP	16	2000	TBD	Call TI	Call TI	-40 to 125		Samples
TPS2HB16DQPWPRQ1	PREVIEW	HTSSOP	PWP	16	2000	TBD	Call TI	Call TI	-40 to 125		
TPS2HB16FQPWPRQ1	PREVIEW	HTSSOP	PWP	16	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) **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 <=1000ppm threshold. Antimony trioxide based flame retardants must also meet the <=1000ppm 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.

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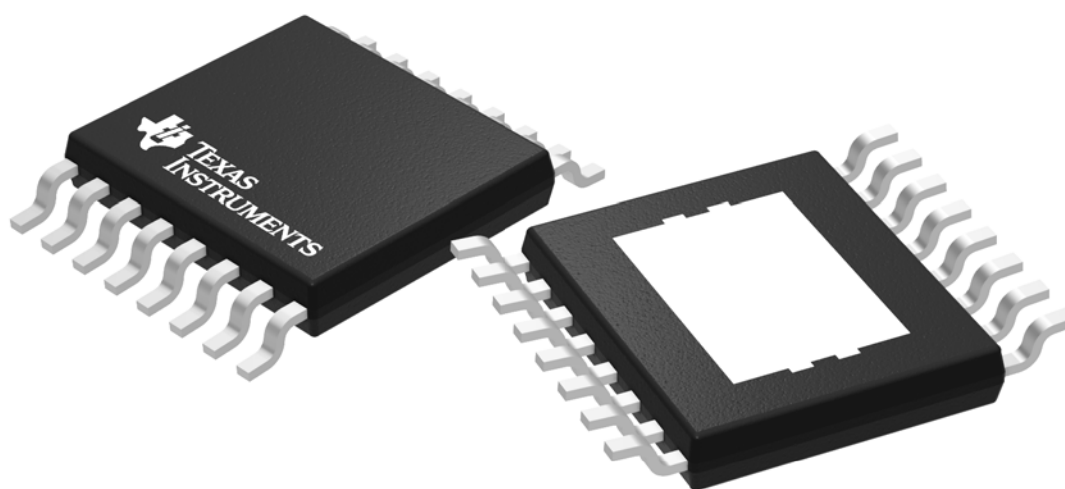


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PACKAGE OPTION ADDENDUM

23-Mar-2018

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.



Images above are just a representation of the package family, actual package may vary.
Refer to the product data sheet for package details.

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