

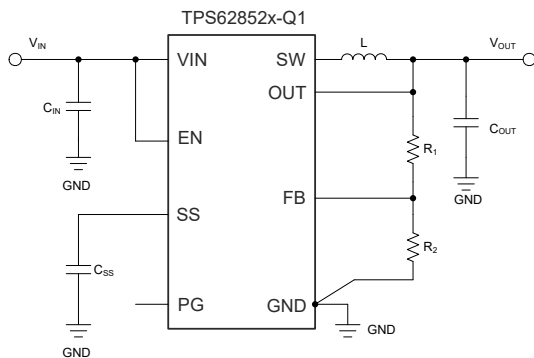
# TPS62852x-Q1 2.7V to 6V, 1A, 2A, 3A, Automotive, Step-Down Converter in a WSON Package

## 1 Features

- AEC-Q100 qualified for automotive applications
  - Device temperature grade 1:  $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$   $T_A$
- Wettable flanks
- Designed for low EMI requirements
  - Optional pseudo-random spread spectrum reduces peak emissions
- $T_J = -40^{\circ}\text{C}$  to  $+150^{\circ}\text{C}$
- Family of 1A, 2A, and 3A (continuous) converters
- Input voltage range: 2.7V to 6V
- Quiescent current: 21 $\mu\text{A}$  typical
- Shutdown current: 1.5 $\mu\text{A}$  typical
- Output voltage from 0.6V to 5.5V
- Output voltage accuracy  $\pm 1\%$  (PWM operation)
- Options of forced PWM or PWM, PFM operation
- Switching frequency in PWM: 2.25MHz
- Adjustable soft start-up to 10ms
- Precise ENABLE input allows:
  - User-defined undervoltage lockout
  - Exact sequencing
- Active output discharge
- Foldback overcurrent protection – optional
- Power-good output with window comparator
- Low profile package with 0.75mm nominal package height

## 2 Applications

- [Advanced driver assistance systems \(ADAS\) camera](#)
- [ADAS sensor fusion and surround view ECU](#)
- [Hybrid and reconfigurable instrument cluster](#)
- [Head unit and telematics control unit](#)
- [External audio amplifier](#)



Simplified Schematic

## 3 Description

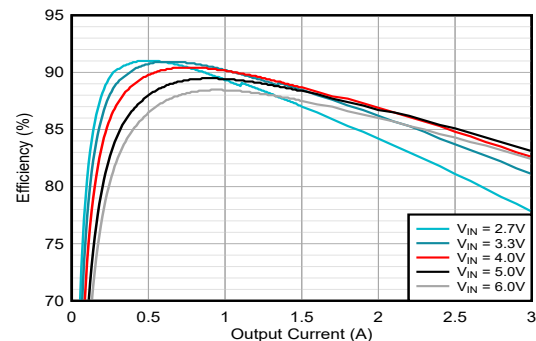
The TPS62852x-Q1 are a family of pin-to-pin, 1A, 2A, and 3A, high efficiency, easy-to-use, synchronous step-down DC/DC converters. These devices are based on a peak current mode control topology and support tight switching frequency variation. These devices are designed for automotive applications such as infotainment and advanced driver assistance systems. Low resistive switches allow up to 3A continuous output current. In the TPS62852x-Q1, the switching frequency is internally fixed at 2.25MHz. The TPS62852x-Q1 automatically selects pulse width modulation (PWM) for higher power demand and pulse frequency mode (PFM) for power saving operation. This selection maintains high efficiency across the whole load range. The device exists also in options with forced PWM in cases where frequency stability requirements dominate. The family provides a 1% output voltage accuracy over the full temperature range in PWM mode, which helps designing power supplies for devices with very tight supply voltage accuracy requirements.

The TPS62852x-Q1 is available in an 8-pin, 2.0mm × 1.5mm, WSON package.

### Device Information

PART NUMBER <sup>(3)</sup>	OUTPUT CURRENT	PACKAGE <sup>(1)</sup>	PACKAGE SIZE <sup>(2)</sup>
TPS628521-Q1 <sup>(4)</sup>	1A	DLS (WSON-HR, 8)	2.00mm × 1.50mm
TPS628522-Q1 <sup>(4)</sup>	2A		
TPS628523-Q1	3A		

- (1) For more information, see [Section 8](#).
- (2) The package size (length × width) is a nominal value and includes pins, where applicable.
- (3) See the [Device Comparison Table](#).
- (4) Preview information (not Advance Information).



Efficiency vs  $I_{OUT}$ ,  $V_{OUT} = 1.1\text{V}$



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ADVANCE INFORMATION

## 4 Device Comparison Table

DEVICE NUMBER	OUTPUT CURRENT	V <sub>OUT</sub> DISCHARGE	FOLDBACK CURRENT LIMIT	TYPICAL OUTPUT CAPACITOR	INDUCTOR	OPERATION MODE	OUTPUT VOLTAGE	PACKAGE TYPE
TPS628523PAWDLRQ1	3A	ON	OFF	2 × 22uF	470nH	FPWM	Adjustable	WDLS <sup>(2)</sup>
TPS628523HAWDLRQ1	3A	ON	OFF	2 × 22uF	200nH	FPWM	Adjustable	WDLS <sup>(2)</sup>
TPS628523SADLSRQ1 <sup>(1)</sup>	3A	ON	OFF	1 × 22uF	470nH	FPWM	Adjustable	DLS
TPS628523PADLSRQ1 <sup>(1)</sup>	3A	ON	OFF	2 × 22uF	470nH	FPWM	Adjustable	DLS
TPS628523PDLSRQ1 <sup>(1)</sup>	3A	ON	OFF	2 × 22uF	470nH	PFM/PWM	Adjustable	DLS
TPS628522SADLSRQ1 <sup>(1)</sup>	2A	ON	OFF	1 × 22uF	470nH	FPWM	Adjustable	DLS
TPS628522PADLSRQ1 <sup>(1)</sup>	2A	ON	OFF	2 × 22uF	470nH	FPWM	Adjustable	DLS
TPS628522HADLSRQ1 <sup>(1)</sup>	2A	ON	OFF	2 × 22uF	200nH	FPWM	Adjustable	DLS

(1) Preview information (not Advance Information)

(2) WDLS - wettable flanks

The TPS628523S and P versions use a 470nH inductor and can be used interchangeably with industry standard devices. The TPS628523H is an enhanced version for 200nH inductors with 2 × 22uF output capacitors. 200nH inductors have lower DC resistance and can have a smaller form factor compared to a 470nH inductor with the same current carrying capability. The TPS628523H also offers best transient behavior and can additionally support higher output capacitance for transient suppression down to very few mV.

## 5 Pin Configuration and Functions

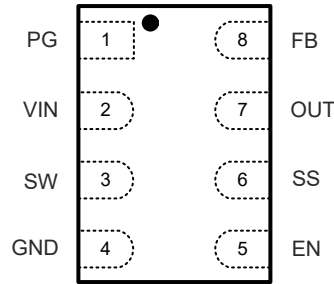


Figure 5-1. 8-Pin WSON-HR DLS (Top View)

Table 5-1. Pin Functions

PIN		TYPE <sup>(1)</sup>	DESCRIPTION
NAME	NO.		
PG	1	O	Open-drain power-good output
VIN	2	—	Power supply input. Make sure the input capacitor is connected as close as possible between the VIN and GND pins.
SW	3	—	This pin is the switch pin of the converter and is connected to the internal power MOSFETs.
GND	4	—	Ground pin
EN	5	I	This pin is the enable pin of the device. Connect to logic low to disable the device. Pull high to enable the device. Do not leave this pin unconnected.
SS	6	I	Soft-Start pin. An external capacitor connected from this pin to GND defines the rise time for the internal reference voltage.
OUT	7	I	Output voltage sense pin. Connect the load to this pin
FB	8	I	Voltage feedback input. Connect the resistive output voltage divider to this pin.

(1) I = input, O = output

## 6 Device and Documentation Support

### 6.1 Device Support

#### 6.1.1 Third-Party Products Disclaimer

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### 6.2 Receiving Notification of Documentation Updates

To receive notification of documentation updates, navigate to the device product folder on [ti.com](http://ti.com). Click on *Notifications* 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.

### 6.3 Support Resources

[TI E2E™ support forums](#) are an engineer's go-to source for fast, verified answers and design help — straight from the experts. Search existing answers or ask your own question to get the quick design help you need.

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### 6.4 Trademarks

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### 6.5 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.

### 6.6 Glossary

[TI Glossary](#) This glossary lists and explains terms, acronyms, and definitions.

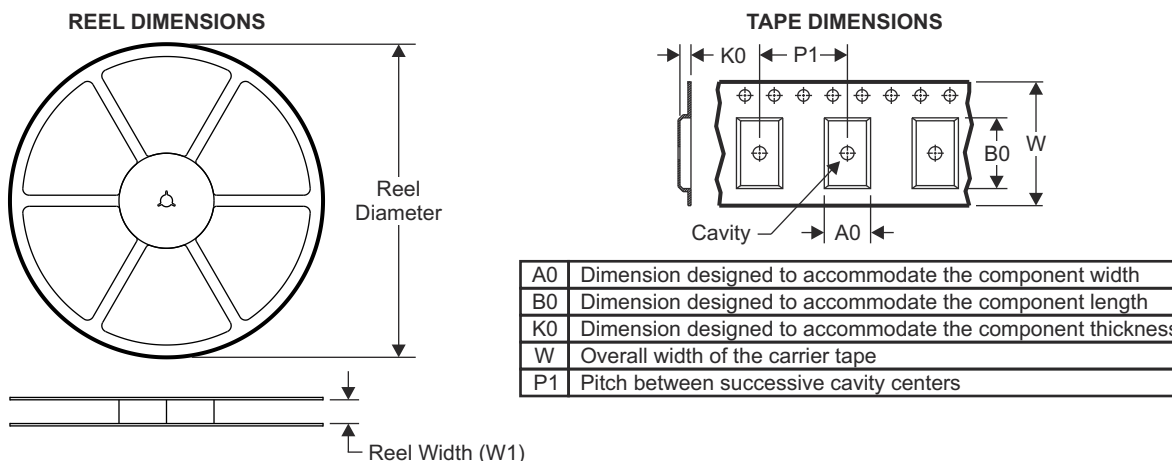
## 7 Revision History

DATE	REVISION	NOTES
February 2025	*	Initial Release

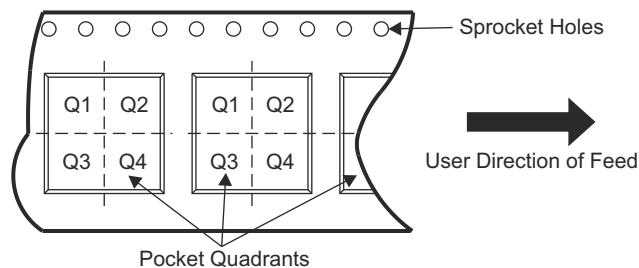
## 8 Mechanical, Packaging, and Orderable Information

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.

### 8.1 Tape and Reel Information



#### QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



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
XPS628523PAWDLSR Q1	WS0N-HR	DLS	8	3000	180	8.4	1.75	2.25	1	4	8	Q1
XPS628523HAWDLSR Q1	WS0N-HR	DLS	8	3000	180	8.4	1.75	2.25	1	4	8	Q1

**TAPE AND REEL BOX DIMENSIONS**



Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
XPS628523PAWDLSRQ1	WSON-HR	DLS	8	3000	210	185	35
XPS628523HAWDLSRQ1	WSON-HR	DLS	8	3000	210	185	35

**ADVANCE INFORMATION**

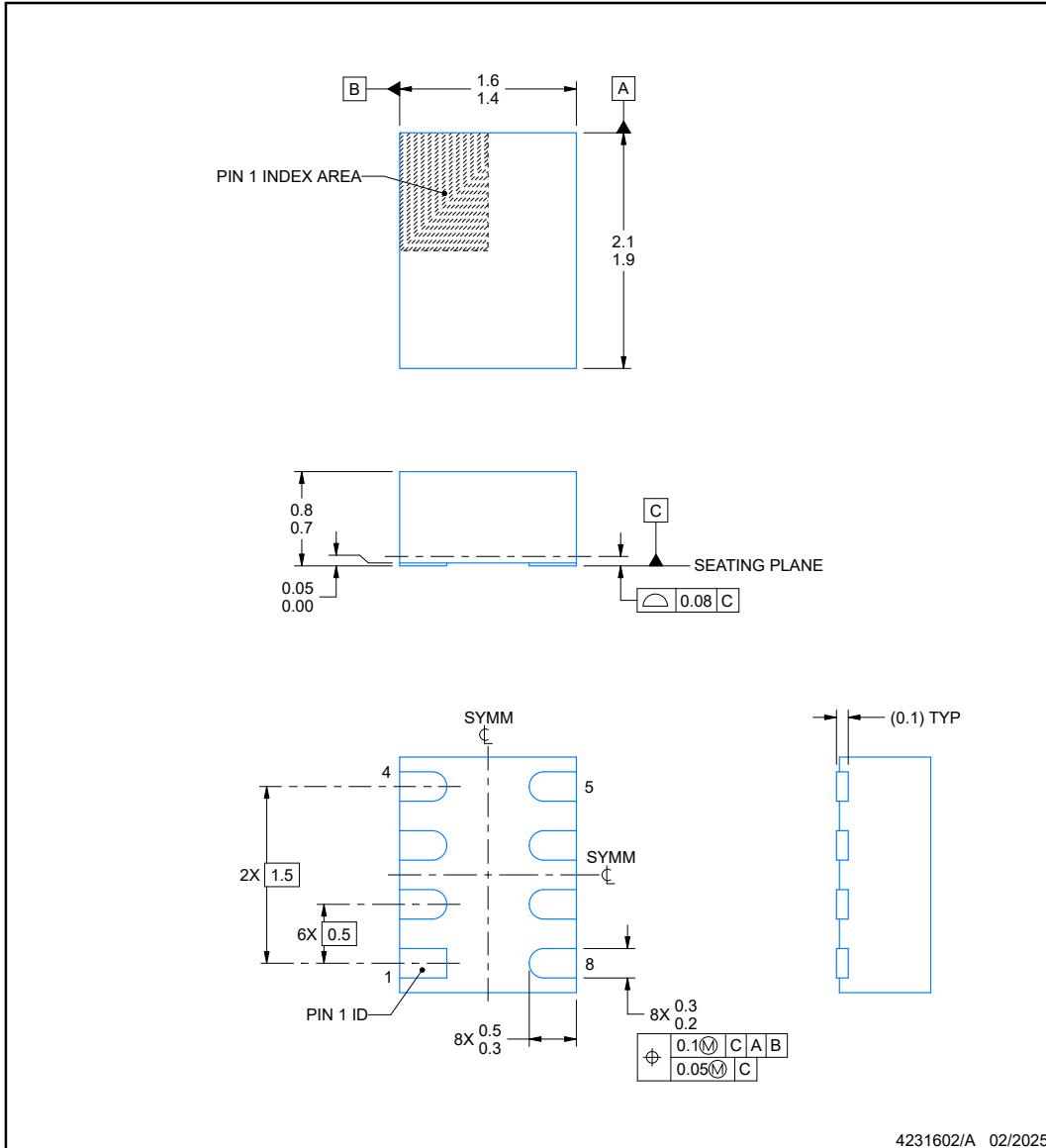
**DLS0008A-C01**



**PACKAGE OUTLINE**

**WSO8-HR - 0.8 mm max height**

PLASTIC SMALL OUTLINE - NO LEAD



NOTES:

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.

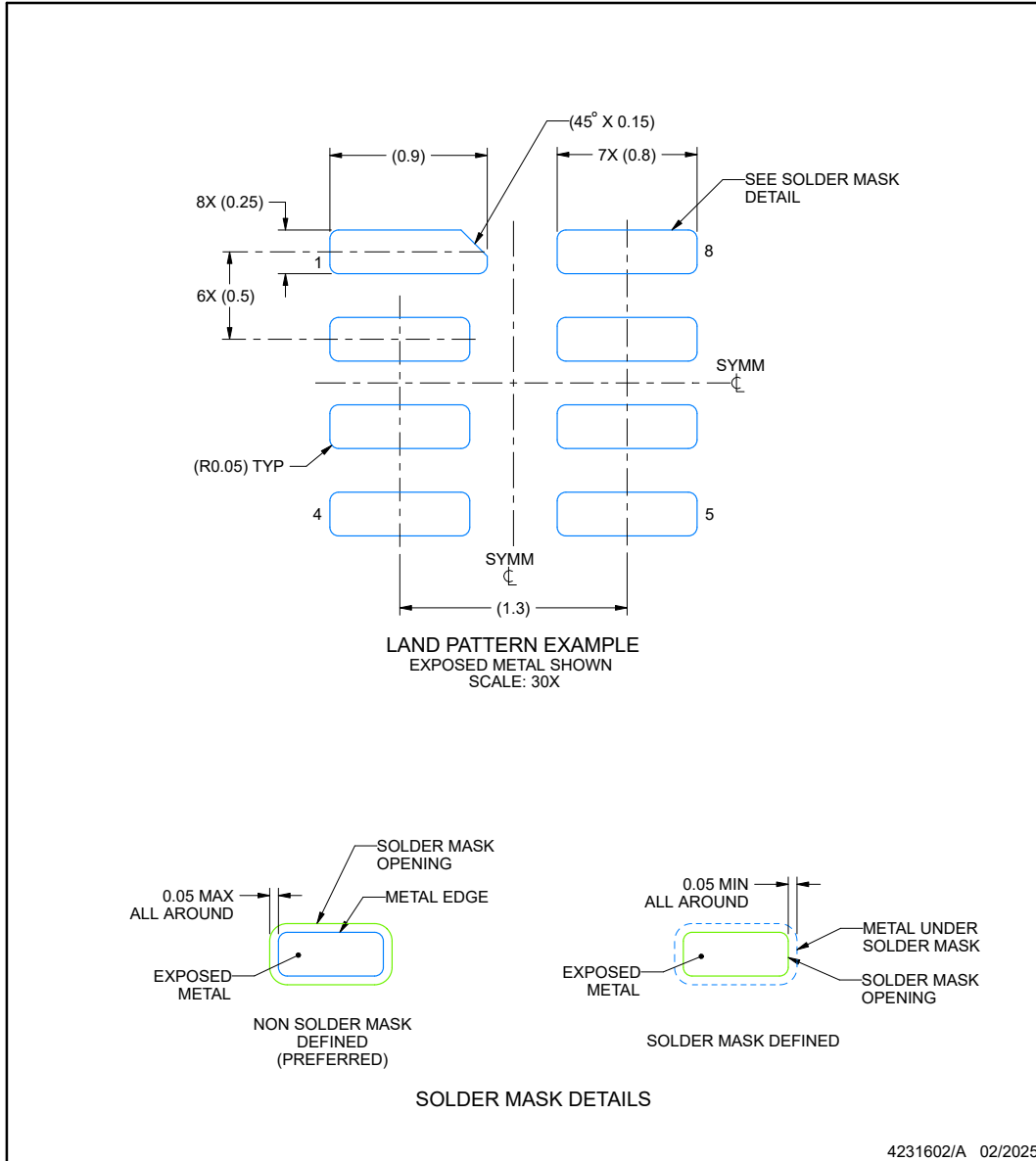


**EXAMPLE BOARD LAYOUT**

**DLS0008A-C01**

**WSON-HR - 0.8 mm max height**

PLASTIC SMALL OUTLINE - NO LEAD



**ADVANCE INFORMATION**

NOTES: (continued)

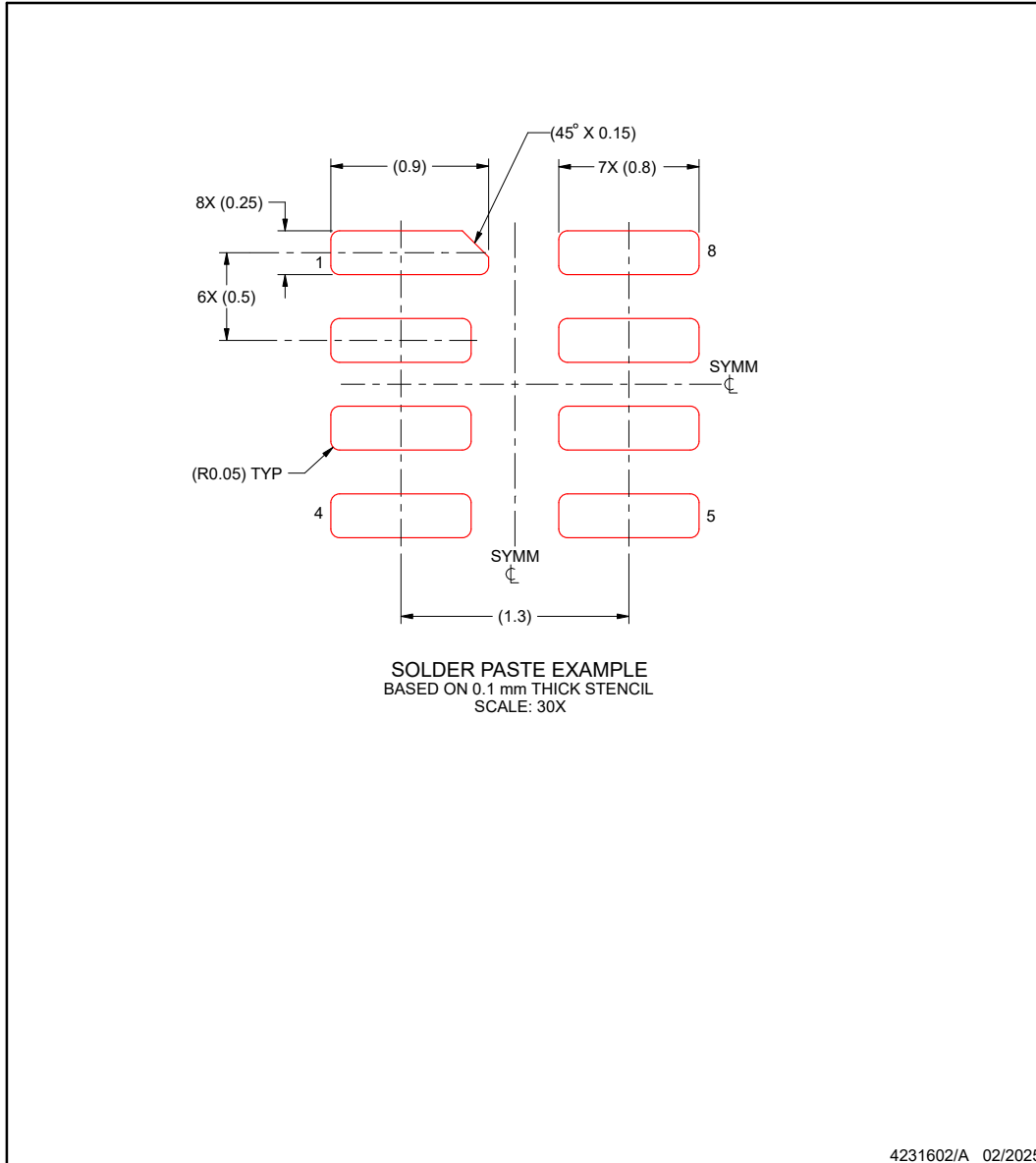
3. For more information, see Texas Instruments literature number SLUA271 ([www.ti.com/lit/slua271](http://www.ti.com/lit/slua271)).

### EXAMPLE STENCIL DESIGN

**DLS0008A-C01**

**WSON-HR - 0.8 mm max height**

PLASTIC SMALL OUTLINE - NO LEAD



NOTES: (continued)

- 4. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.

**PACKAGING INFORMATION**

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead finish/ Ball material (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
XPS628523HAWDLSRQ1	ACTIVE	WSON-HR	DLS	8	3000	TBD	Call TI	Call TI	-40 to 125		Samples
XPS628523PAWDLSRQ1	ACTIVE	WSON-HR	DLS	8	3000	TBD	Call TI	Call TI	-40 to 125		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) **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 finish/Ball material - Orderable Devices 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.

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