
LPS33HW digital pressure sensor: hardware guidelines for system integration

By Mauro Scandiuzzo

Main components	
LPS33HW	MEMS pressure sensor: 260-1260 hPa absolute digital output barometer with water resistant package

Purpose and benefits

The purpose of this design tip is to introduce the integration guidelines of the LPS33HW pressure sensor in the final application.

Description

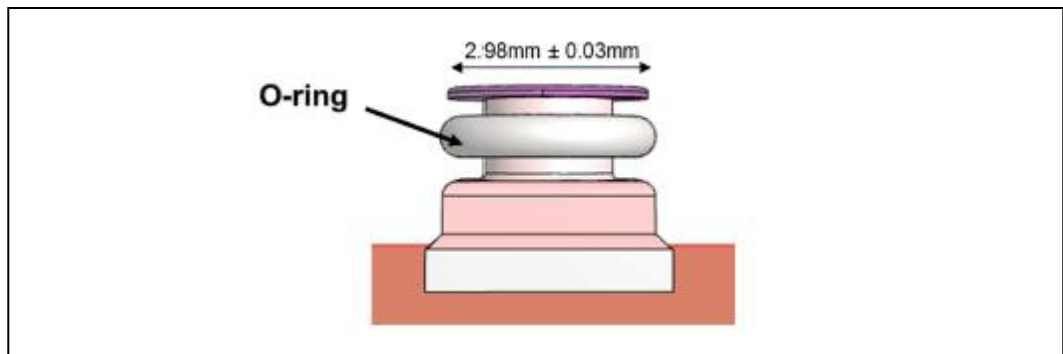
The LPS33HW is capable of being integrated in a 10 bar water-resistant design. In order to achieve a good seal, it is important to properly design the final package.

O-ring implementation

ST suggests using a commercial type O-ring with an inner diameter of 1.15 mm and a thickness of 1.0 mm for the implementation.

Figure 1 shows how the O-ring is allocated around the LPS33HW, while a top view of the ring is shown in Figure 2.

Figure 1. O-ring implementation



The O-ring used to seal the metal lid of the package against the plastic wall of the socket is a nitrile 70 Shore standard part.

Figure 2. O-ring top view



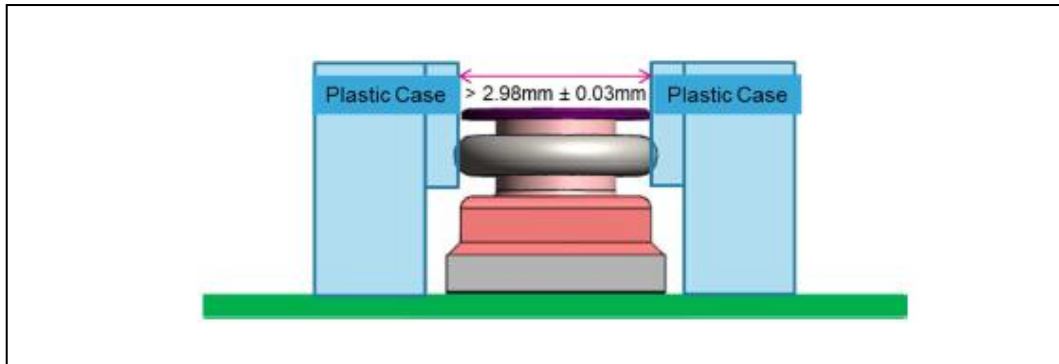
Commercial O-ring characteristics:

- 1.15 mm inner thickness
- 1.0 mm thickness

Seal implementation

The seal is achieved through the mechanical pressure applied between the O-ring and the inner socket walls. Figure 3 illustrates how the seal is implemented.

Figure 3. Seal implementation



Integration tips

The recommendation for the integration of the LPS33HW in the final package is as follows:

1. Consider the tolerance of the device and at the PCB level such as thickness of the ceramic base, metal lid, glue, solder paste on the PCB, alignment device on the PCB, and housing/case tolerance. Also consider a margin on the housing design. The LPS33HW maximum height is 2.9 mm, as shown in Table 1.

Table 1. LPS33HW package dimensions

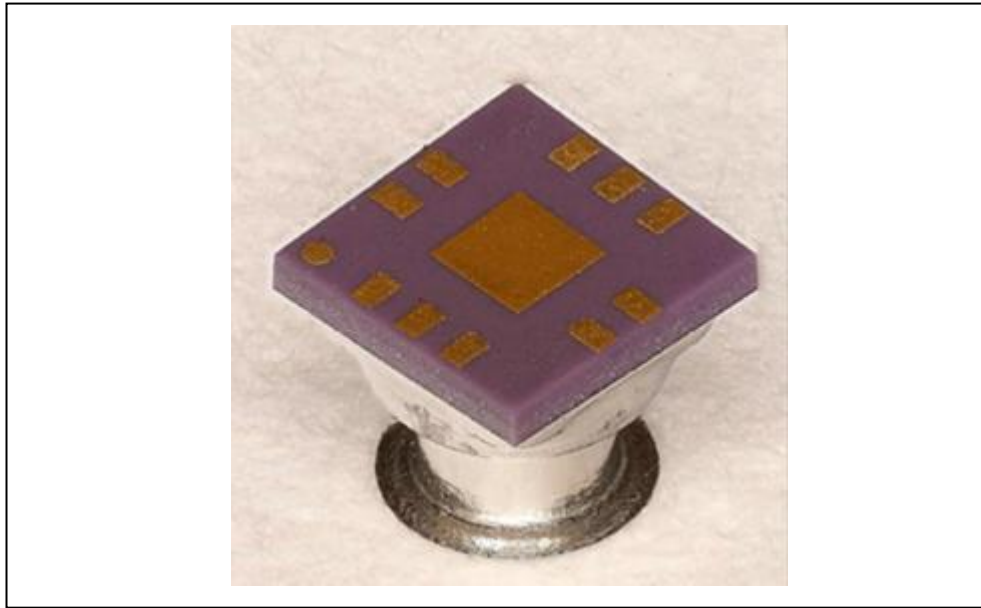
Item	Dimension [mm]	Tolerance [mm]
Length [L]	3.3	+/- 0.15
Width [W]	3.3	+/- 0.15
Height [H]	2.9 max	/

2. Avoid putting the LPS33HW too close to the external border to prevent the damage of the device.
3. Protect the device and avoid exposing it directly to any significant external light sources.
4. An adequate air flow channel is required for the device to function properly (for example: L-shape channel).

ST suggestions for the PCB design:

- Refer to the TN1198: Surface mount guidelines for MEMS sensors in HLGA packages
- LPS33HW is compliant with the standard JEDEC J-STD-020
- Central pad (Figure 4) does not have electrical functionality but it has been designed as an anchor to reinforce the adhesion to the PCB. Important for the drop test - ST suggests that it is connected to the ground.
- Dust and contamination during the assembly process and any damage to the gel during the handling must be avoided.
- Pay attention to the cleaning process after soldering so as not to introduce dust and damage the gel inside the cavity.

Figure 4. LPS33HW bottom view



Support material

Related Documentation
Datasheet: LPS33HW, MEMS pressure sensor: 260-1260 hPa absolute digital output barometer with water resistant package
Technical note TN1198: Surface mount guidelines for MEMS sensors in HLGA packages

Revision history

Date	Version	Changes
07-Dec-2017	1	Initial release

IMPORTANT NOTICE – PLEASE READ CAREFULLY

STMicroelectronics NV and its subsidiaries (“ST”) reserve the right to make changes, corrections, enhancements, modifications, and improvements to ST products and/or to this document at any time without notice. Purchasers should obtain the latest relevant information on ST products before placing orders. ST products are sold pursuant to ST’s terms and conditions of sale in place at the time of order acknowledgement.

Purchasers are solely responsible for the choice, selection, and use of ST products and ST assumes no liability for application assistance or the design of Purchasers’ products.

No license, express or implied, to any intellectual property right is granted by ST herein.

Resale of ST products with provisions different from the information set forth herein shall void any warranty granted by ST for such product.

ST and the ST logo are trademarks of ST. All other product or service names are the property of their respective owners.

Information in this document supersedes and replaces information previously supplied in any prior versions of this document.

© 2017 STMicroelectronics – All rights reserved