Retrofit CH101 Omnidirectional Module (MOD_CH101-03-01) with a 45° Field-of-View Horn (AH-10133-045045MR)

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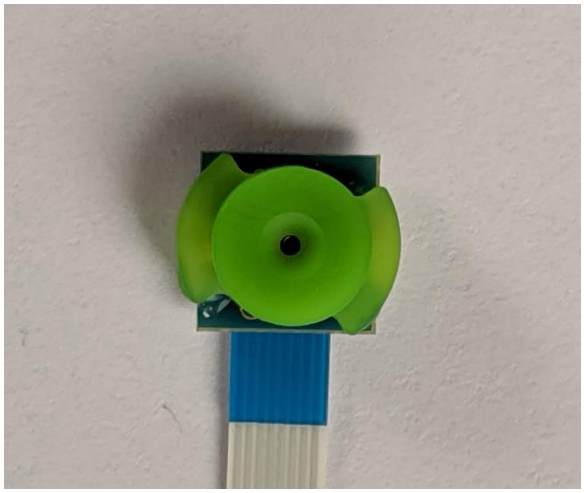
1 INTRODUCTION

This document provides information on the AH-10133-045045MR 45° FoV horn design and general guidance on integration to the MOD_CH101-03-01. Use of this horn allows the user to modify the CH101 from an 180° FoV to a 45° FoV. CAD file for AH-10133-045045MR horn design is available from Chirp to allow 3D printing of horns. Recommendations are included for adhesives, gluing instructions and basic verification after installation of horn to the module.

Figure 1. MOD_CH101-03-01 module with AH-10133-045045MR horn



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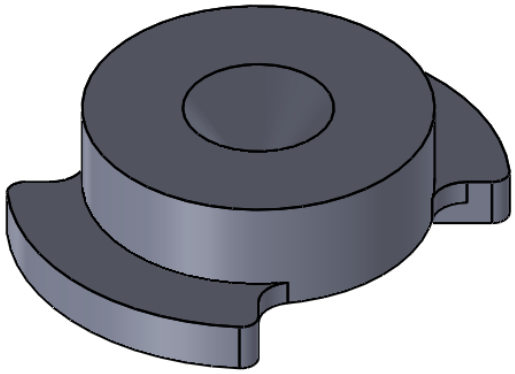
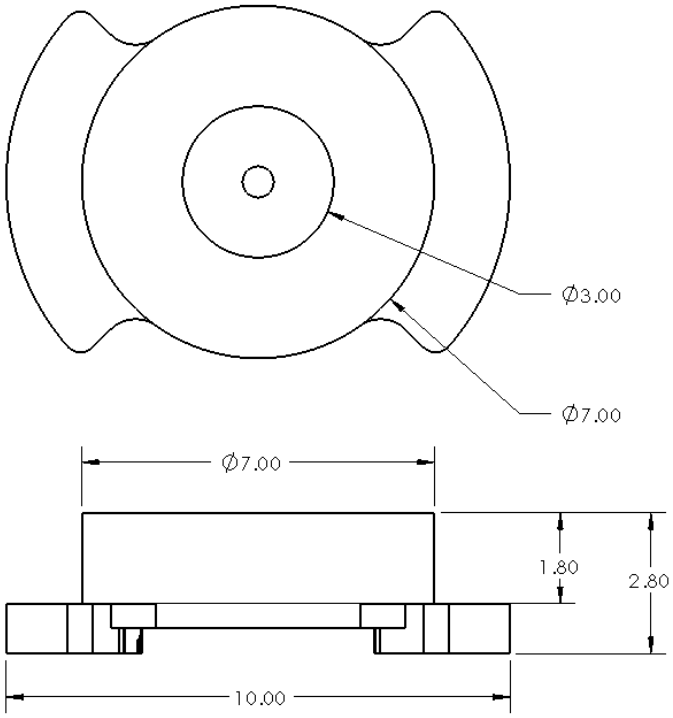
2 AH-10133-045045MR HORN DRAWING

AH-10133-045045MR: 45° Narrow FoV Housing Dimensions

Design	Type	Diameter (mm)		Length (mm)	Field of View (FoV)	
		Vertical	Horizontal		Vertical	Horizontal
AH-10133-04504-MR	Conical	3	3	1.8	45°	45°





Key Dimensions:

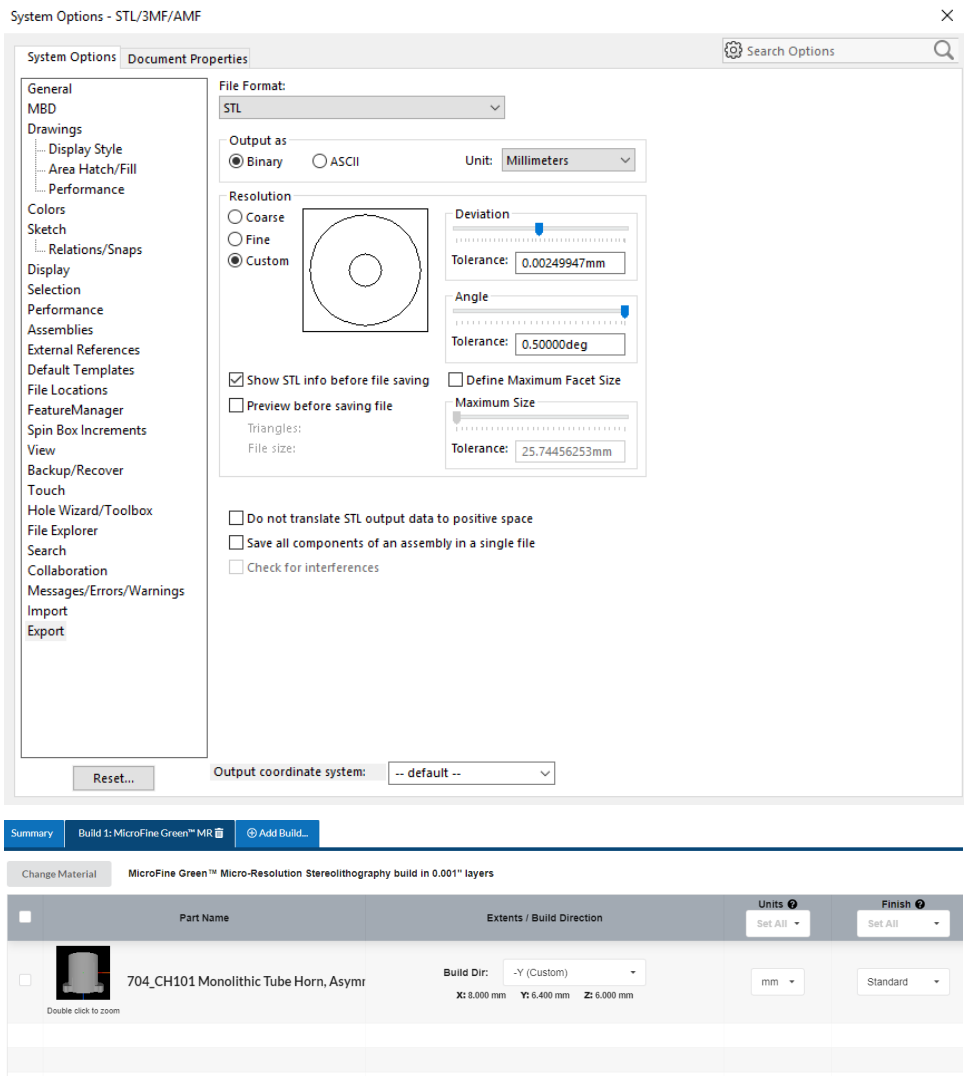
- 3.0 mm “mouth” diameter opening
- 0.8 mm “throat” opening
- 2.8 mm total thickness

3 REQUIREMENTS FOR HORN 3D PRINTING

The horns can be produced using an SLA, Stereolithography, 3D printing method with the STP file provided by Chirp.

- Chirp recommends using Protolabs' "MicroFineGreen" material to 3D print horns: https://www.protolabs.com/, or equivalent SLA 3D Printer
- Make sure the STL file export settings in your mechanical CAD software has linear tolerance deviations of < 0.001 mm and angular tolerance of < 0.5 degrees.
- In the Protolabs print configurator, be sure to specify the print direction such that it prints from the opening of the horn towards the sensor interface

Figure 2. Protolabs Print Configurator



4 HORN GLUING INSTRUCTIONS

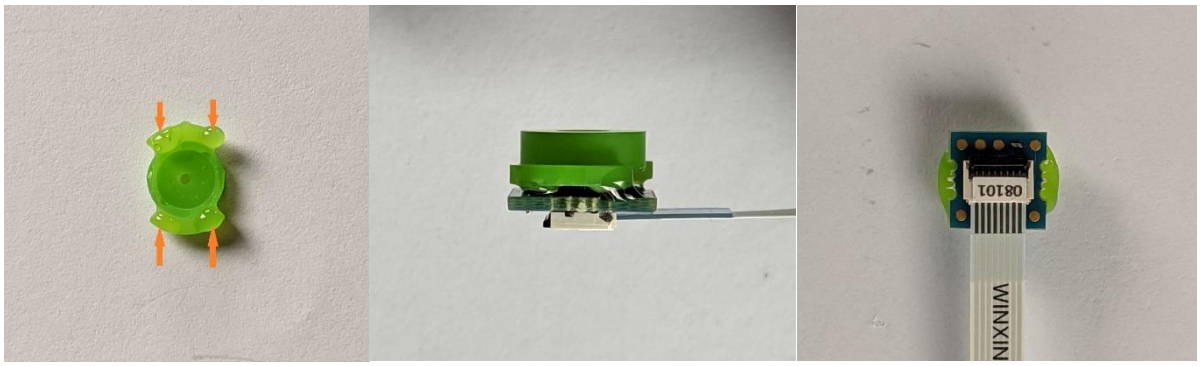
Recommend using adhesive listed, or similar non-gassing and non-expanding UV cured adhesive. Care must be taken when gluing the “add on” AH-10133-045045MR 45° horn to the AH101-180180 180° FoV black cap on the CH101 module. The glue may have too thin of viscosity or adhesive outgassing that could wick into the device and damage the transceiver.

- Dymax 9-911-REV-A Ultra-Light Weld
- Solarez Thick, Hard Formula

Figure 3. UV Cured Adhesives

- To mount horn, place 0.6ml dots of adhesive on each corner of AH-10133-045045MR horn flanges as shown in first picture of Figure 4 below.
- The prescribed amount of adhesive will provide enough strength for standard handling of the module.
- Place the horn over the 180° FOV black plastic cap (AH-10100-180180), and check to ensure the horn is seated perfectly flat in relation to the PCB. Cure the adhesive with a UV light source.
- Verify the horn is seated parallel to the PCB and test horn for functionality.

Figure 4. UV Cured Glue Applied to Horn

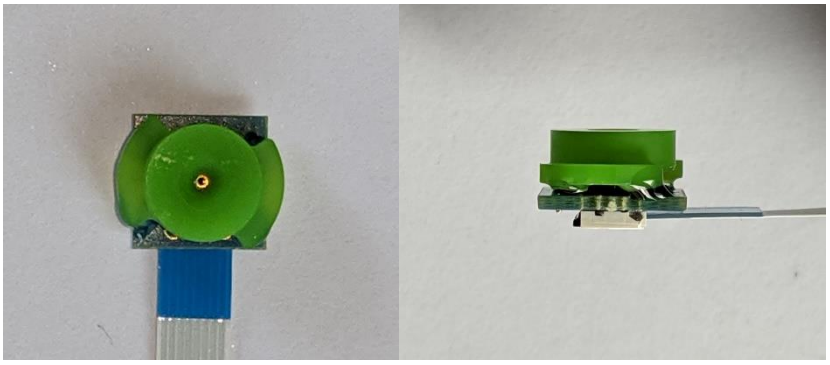


5 VERIFY AH-10133-045045MR HORN

Physical check for cap alignment

- Poor placement will result in long ringdown which will be visible as an elevated second peak on the A-Scan. It can also trigger false positives on the target detection.
- Horn throat should align with port of the CH101. Looking down into the horn you should see the gold of the sensor port rim aligned inside the cap.

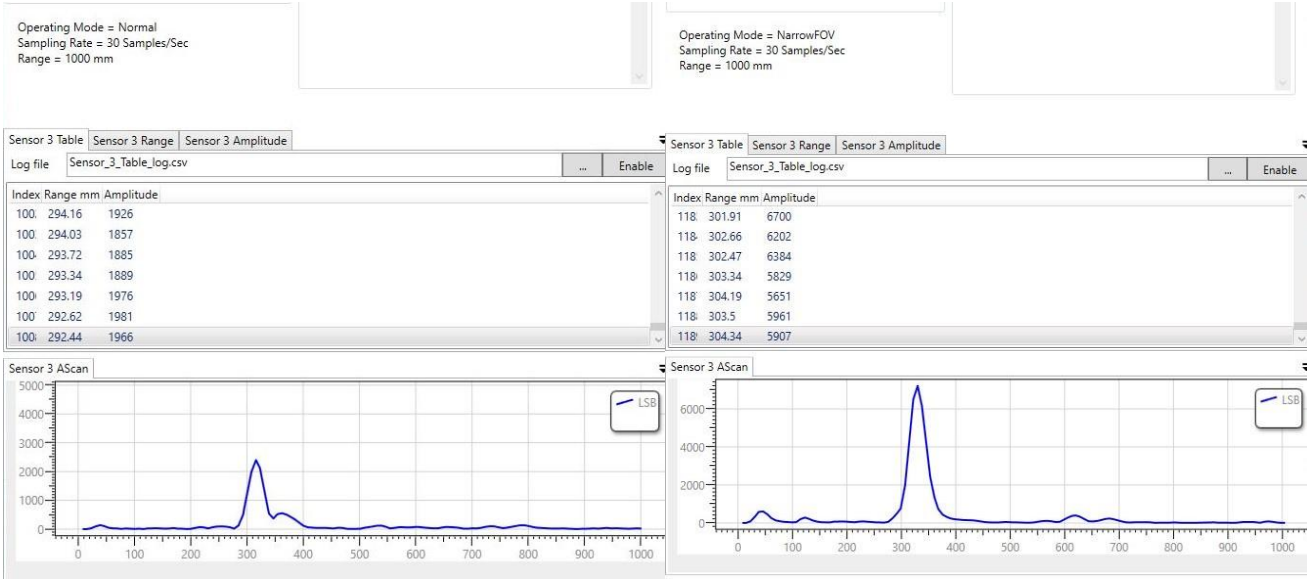
Figure 5. Physical Alignment of Horn



Signal amplitude check

- Check the intensity of a target (e.g., a hand). The hand should be very high intensity on axis and should be very low or not detected from +/- 30 degrees off axis with the AH-10133-045045MR horn. Below is an A-Scan plot, Range and Amplitude data table shown for a hand at ~30 cm above the sensor module with AH-10133-045045MR horn.
- A typical amplitude increase of 3x occurs after installation of the 45° FoV horn. Take an averaged measurement with the 180° FOV horn and compare that to on-axis average measurement with the 45° FOV horn after installation.

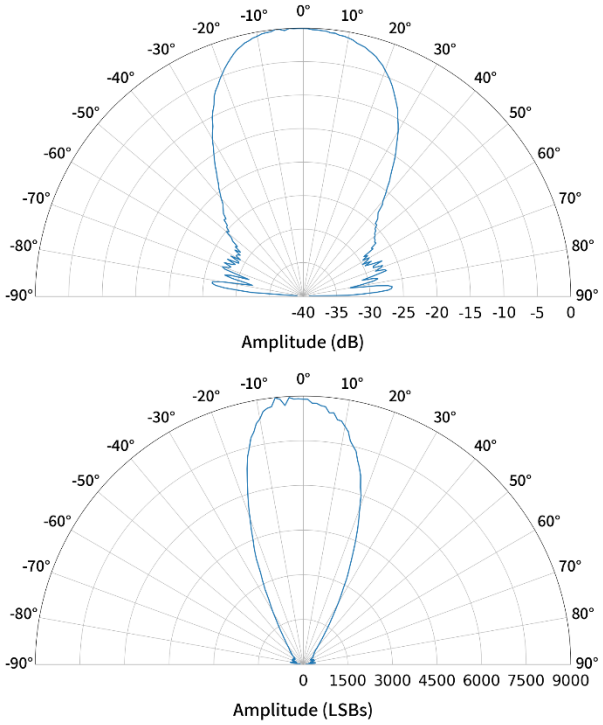
Figure 6. 180° FOV Ascan vs. 45° FOV Ascan of Hand at ~30cm



6 SENSOR BEAM PATTERN

Pulse-echo beam-pattern plots of the CH101 sensor with a AH-10133-045045MR 45° FoV horn are shown below. This beam-pattern was measured by placing a 1 m² target at a 60 cm distance from the CH101 module and recording the CH-101 ToF amplitude as the sensor was rotated through 180°. The plots are shown in both raw LSB units and normalized dB units, where 0 dB corresponds to the peak amplitude (9,000 LSB) recorded on-axis.

Figure 7. dB and LSB plot



7 REVISION HISTORY

Revision Date	Revision	Description
4/9/2020	1.0	Initial release
5/8/2020	1.1	Updated part numbers