TDK EV_MOD_CH101 Evaluation Module User Guide

Contents

TDK EV_MOD_CH101 Evaluation Module

Product Information

Specifications

- **Manufacturer:** Chirp Microsystems
- **Model:** EV_MOD_CH101 Evaluation Module
- **Address:** 2560 Ninth Street, Ste 200, Berkeley, CA 94710 U.S.A
- **Document Number:** AN-000231
- **Revision:** 1.0
- **Release Date:** 08/18/2020

Product Usage Instructions

1. **EV_MOD_CH101 Evaluation Module Board Overview**
   The EV_MOD_CH101 Evaluation Module Board is designed for evaluation and testing purposes. It features various pins for different functions as outlined below:
2. **Pin Assignments**

PIN	NAME	DESCRIPTION
1	INT	Interrupt output. Can be switched to input for triggering and calibration functions.

3. **Electrical Specifications**
   For detailed electrical specifications, please refer to the DS-000331 CH101 Datasheet available from the manufacturer. Ensure proper power supply connections and adherence to recommended voltage levels.
4. **Schematic**
   The EV_MOD_CH101 module utilizes an 8-pin 0.5 mm pitch flat flex cable (FFC) connector for electrical connections. Refer to the schematic diagram provided for proper pinout and connection instructions.

Frequently Asked Questions (FAQ)

Q: Can I share connections between multiple EV_MOD_CH101 modules?
A: Each EV_MOD_CH101 module requires its own PROG and INT lines, while the remaining connections can be shared. Refer to the CH101 datasheet for further information.

SCOPE AND PURPOSE

This document details the specification, programming, and operation of an EV_MOD_CH101-03-01 (referred to as the EV_MOD_CH101 in the remainder of this document) ultrasonic sensor evaluation module. The module board incorporates a CH101 Ultrasonic Sensor device with an omnidirectional acoustic housing assembly, a capacitor, and an FPC/FFC connector. This evaluation module can perform pitch-catch and pulse-echo range-finding at distances from 4 cm to 1.2m. Several programming options are available for medium and short-range applications.

Figure 1. View of EV_MOD_CH101 evaluation module with an omnidirectional acoustic housing

EV_MOD_CH101 EVALUATION MODULE BOARD

PIN ASSIGNMENTS

PIN	NAME	DESCRIPTION
1	INT	Interrupt output. Can be switched to input for triggering and calibration functions
2	SCL	SCL Input. I^2C clock input. This pin must be pulled up to VDD externally.
3	SDA	SDA Input/Output. I^2C data I/O. This pin must be pulled up to VDD externally.
4	PROG	Program Enable. This pin must be pulled down to the ground externally.
5	RESET_N	Active-low reset. This pin must be pulled up to VDD externally.
6	VSS	Power return.
7	VSS	Power return.
8	VDD	Power supply input. Connect to externally regulated 1.8V supply

Table 1. EV_MOD_CH101 ZIF Connector Pin-Out

ELECTRICAL SPECIFICATIONS

Please refer to the DS-000331 CH101 Datasheet for information on the device's electrical characteristics. Please note that the datasheet covers CH101 part numbers with different suffixes. Regardless, the electrical specifications in the datasheet still apply.

SCHEMATIC

Electrical connection to the EV_MOD_CH101 module is via an 8-pin 0.5 mm pitch flat flex cable (FFC) connector. Part numbers of the FFC connectors on the module PCB and the recommended FFC cables are shown in Table 2. The electrical schematic of the module, including the connector pinout and the connections to the EV_MOD_CH101 module, is shown in Figure 2. Note that the 0.1 µF decoupling capacitor, as recommended in the CH101 datasheet, is included in the module. Consult the CH101 datasheet and application notes for additional information on the electrical connections and operation.

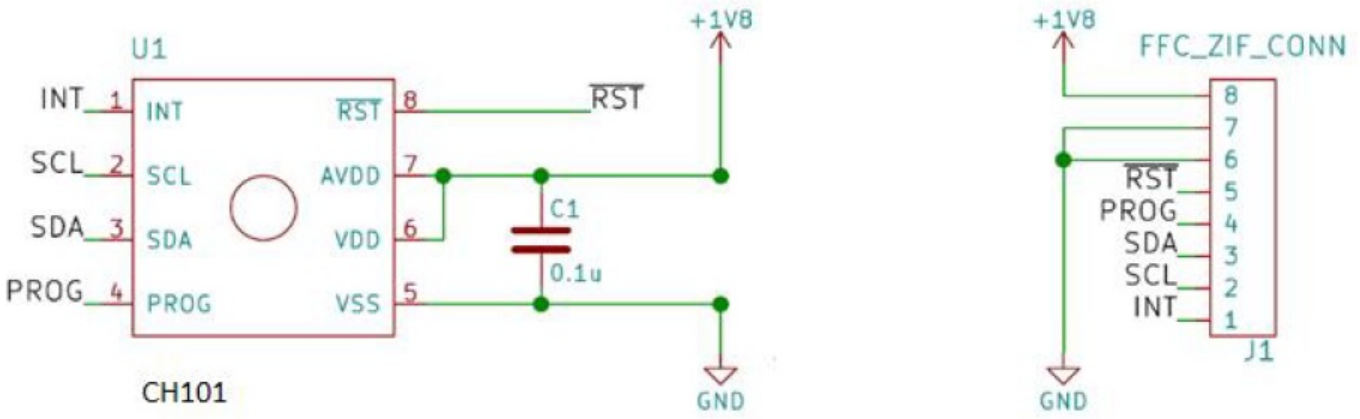

Figure 2. EV_MOD_CH101 Schematic

Each EV_MOD_CH101 requires its own PROG and INT lines, the remaining connections can be shared. Refer to the CH101 datasheet for additional information. Module connections using a flat flex cable (FFC) are shown in Figure 3.

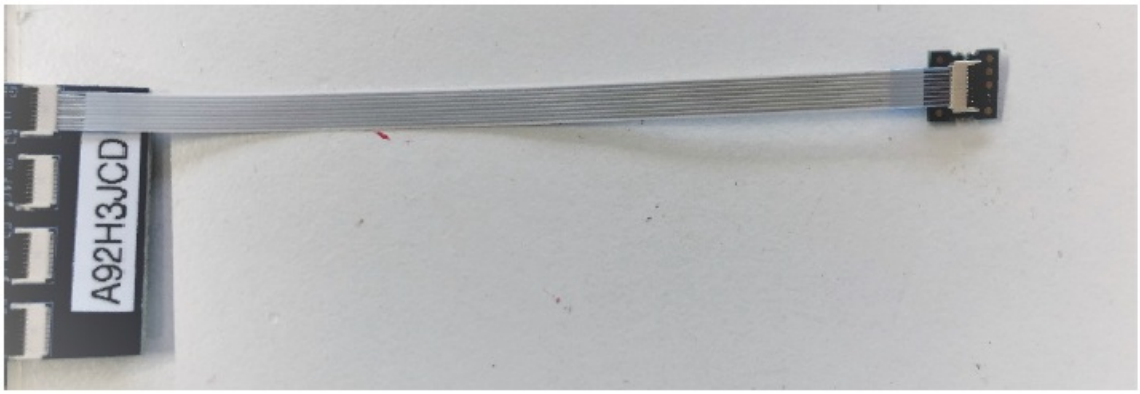

Figure 3. EV_MOD_CH101 Module Connection (EV_MOD_CH101 acoustic port is facing down)

FLAT CABLE CONNECTOR TYPE	Molex 503480-0800
RECOMMENDED FLAT CABLE	Molex 151660073…151660094

Table 2. Recommended Flat Flex Cable and Connector

BILL OF MATERIALS

QUANTITY	REFERENCE	PART	PCB FOOTPRINT	MANUFACTURER	MANUFACTURER PART NUMBER
1	PCB	PCB	NA		
1	U1	CH101-03	Custom – 8 Pin	TDK	CH101-03
1	C1	100n 6.3V 20% X7R 0402	0402	TDK	CGA2B1X7R1C104K050BC
1	J1	Connector, FPC-FFC, 8-Pin	8Pin, 0.5 mm Pitch	Molex	503480-0800

Table 3. Bill of Material

CONFIGURATION, PROGRAMMING, AND OPERATION

Please refer to the DS-000379 CH101 Datasheet for information on the device's electrical characteristics.

CONFIGURATION AND PROGRAMMING

Please refer to the following documents for configuration and programming information:

- AN-000154 SmartSonic Hello Chirp Hands-On Document
- AN-000175 SonicLib Programmers Guide

OPERATION

Please refer to the following documents for operating information:

- AN-000155 CHx01 SonicLink Software Quick Start Guide
- AN-000180 CH101 and CH201 SmartSonic Evaluation Kit Users Guide

MECHANICAL SPECIFICATIONS

DIMENSION	EV_MOD_CH101	UNIT
Acoustic port hole	0.7	mm
Maximum width	8.15	mm
Module height	3.57	mm

Table 4. Geometric Dimensions for EV_MOD_CH101

The outer dimensions of the EV_MOD_CH101 assembly are shown in Figure 4. The acoustic port hole has a diameter of 0.7 mm and is in the center of the front face. During transducer operation, the port cannot be occluded or covered.

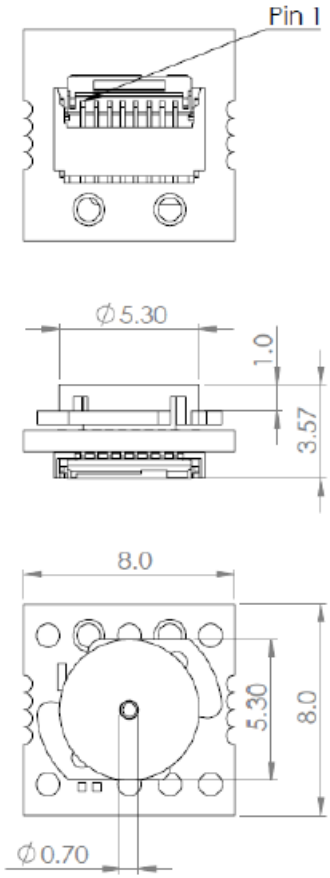

Figure 4. Dimensions of the EV_MOD_CH101 assembly

SENSOR MOUNTING AND BEAM PATTERNS

SENSOR MOUNTING

To achieve the best acoustic performance, users are recommended to mount the EV_MOD_CH101 module on a flat mounting plate. An example mounting plate is shown in Figure 5, where the sensor has been inserted into a 5.3 mm diameter hole and has been drilled in a 1 mm thick plastic plate measuring 135 mm x 175 mm.

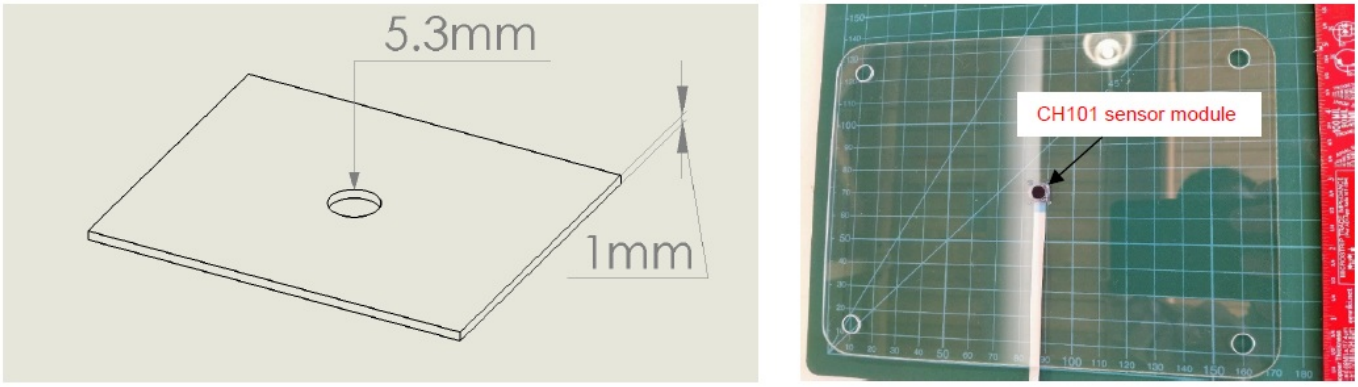

Figure 5. Recommended EV_MOD_CH101 module mounting

BEAM PATTERNS

Pulse-echo beam-pattern plots of the EV_MOD_CH101 module are shown in Figure 6. This beam pattern was measured by placing a 1m2 target at a 30 cm distance from the EV_MOD_CH101 module and recording the ToF amplitude as the sensor is rotated 180°. The plots are shown in both raw LSB units and normalized dB units, where 0 dB corresponds to the peak amplitude (5000 LSB) recorded on-axis. Chirp defines the field-of-view (FoV) as the full width at half-maximum (FWHM) of the beam pattern; in other words, the FoV is the range of angles over which the amplitude remains above half the peak amplitude (or -6 dB). When mounted in the recommended plate, the sensor's FoV is approximately 180° and the pulse-echo amplitude diminishes relatively smoothly from 0° to

±80°.

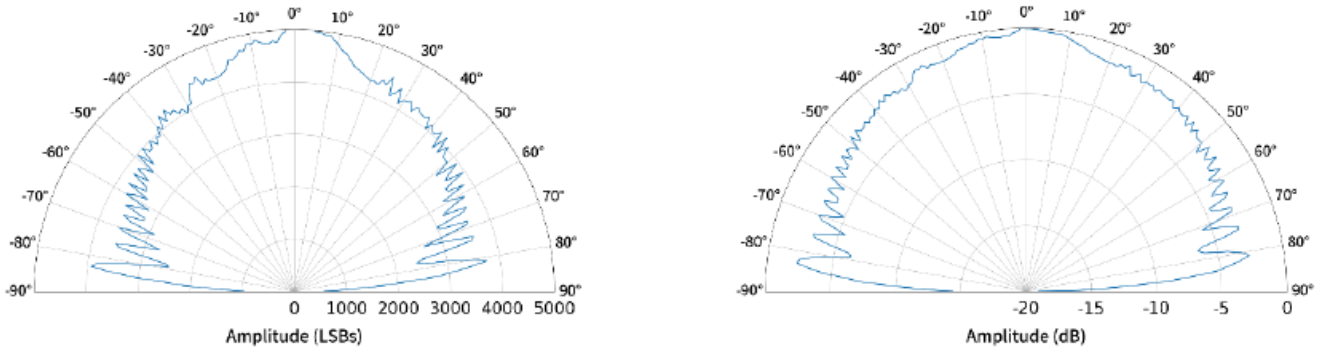

Figure 6. Beam pattern measurements of module in 100 mm plate (raw linear LSB units left, normalized dB right)

For comparison, the pulse-echo beam-pattern plot measured for an EV_MOD_CH101 when tested without a sensor mounting plate is shown in Figure 7. The beam pattern has three lobes: a main lobe and two side lobes that are centered at ±45°. The sensor device will work well for detecting on-axis targets, but targets located at ±25° will have approximately 70% lower (-10 dB) amplitude, possibly resulting in poor range-finding performance.

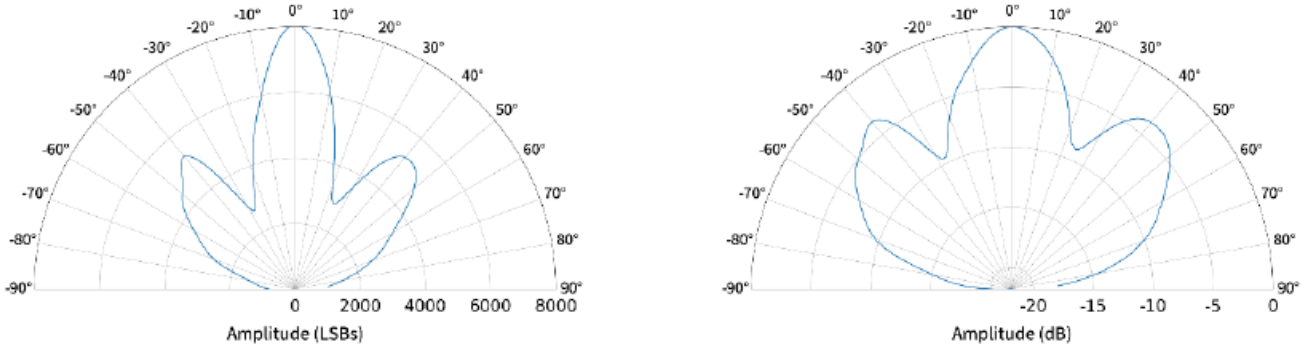

Figure 7. Beam pattern measurements of an EV_MOD_CH101 (w/o a mounting plate)

(raw linear LSB units left, normalized dB right)

REVISION HISTORY

REVISION DATE	REVISION	DESCRIPTION
08/18/2020	1.0	Initial Release

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Chirp Microsystems reserves the right to change specifications and information herein without notice.

Chirp Microsystems

- 2560 Ninth Street, Ste 200, Berkeley, CA 94710 U.S.A
- +1(510) 640–8155
- www.chirpmicro.com.

Documents / Resources

	TDK EV_MOD_CH101 Evaluation Module [pdf] User Guide EV_MOD_CH101 Evaluation Module, EV_MOD_CH101, Evaluation Module, Module

References

- User Manual