LX34211
Inductive Position Sensor Evaluation Boards/Kits User's Guide

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Table of Contents

NOTES:

Preface

NOTICE TO CUSTOMERS

All documentation becomes dated, and this manual is no exception. Microchip tools and documentation are constantly evolving to meet customer needs, so some actual dialogs and/or tool descriptions may differ from those in this document. Please refer to our web site (www.microchip.com) to obtain the latest documentation available.

Documents are identified with a "DS" number. This number is located on the bottom of each page, in front of the page number. The numbering convention for the DS number is "DSXXXXXXXXA", where "XXXXXXXX" is the document number and "A" is the revision level of the document.

For the most up-to-date information on development tools, see the MPLAB® IDE online help. Select the Help menu, and then Topics to open a list of available online help files.

INTRODUCTION

This chapter contains general information that will be useful to know before using the LX34211 Inductive Position Sensor Evaluation Boards/Kits. Items discussed in this chapter include:

- Document Layout
- Conventions Used in This Guide
- Recommended Reading
- The Microchip Web Site
- Customer Support
- Revision History

DOCUMENT LAYOUT

This document describes how to use the LX34211 Inductive Position Sensor Evaluation Boards/Kits as a development tool to emulate and debug firmware on a target board. The document is organized as follows:

- **Chapter 1. "Product Overview"** – This chapter includes important information about the LX34211 Inductive Position Sensor Evaluation Boards/Kits, as well as the contents of the kit and a step-by-step Quick Start Guide.
- **Chapter 2. "Technical Information"** – This chapter provides technical details important for the operation of the LX34211 Inductive Position Sensor Evaluation Boards/Kits.

CONVENTIONS USED IN THIS GUIDE

This manual uses the following documentation conventions:

DOCUMENTATION CONVENTIONS

Description	Represents	Examples
Arial font:		
Italic characters	Referenced books	*MPLAB® IDE User's Guide*
	Emphasized text	...is the *only* compiler...
Initial caps	A window	the Output window
	A dialog	the Settings dialog
	A menu selection	select Enable Programmer
Quotes	A field name in a window or dialog	"Save project before build"
Underlined, Italic text with right angle bracket	A menu path	*File>Save*
Bold characters	A dialog button	Click **OK**
	A tab	Click the **Power** tab
N'Rnnnn	A number in verilog format, where N is the total number of digits, R is the radix and n is a digit.	4'b0010, 2'hF1
Text in angle brackets < >	A key on the keyboard	Press <Enter>, <F1>
Courier New font:		
Plain Courier New	Sample source code	`#define START`
	Filenames	`autoexec.bat`
	File paths	`c:\mcc18\h`
	Keywords	`_asm, _endasm, static`
	Command-line options	`-Opa+, -Opa-`
	Bit values	`0, 1`
	Constants	`0xFF, 'A'`
Italic Courier New	A variable argument	*`file`*`.o`, where *`file`* can be any valid filename
Square brackets [ ]	Optional arguments	`mcc18 [options]` *`file`* `[options]`
Curly brackets and pipe character: { | }	Choice of mutually exclusive arguments; an OR selection	`errorlevel {0|1}`
Ellipses...	Replaces repeated text	`var_name [, var_name...]`
	Represents code supplied by user	`void main (void) { ... }`

RECOMMENDED READING

This user's guide describes how to use LX34211 Inductive Position Sensor Evaluation Boards/Kits. Other useful documents will be listed below once they become available.

THE MICROCHIP WEB SITE

Microchip provides online support via our web site at www.microchip.com. This web site is used as a means to make files and information easily available to customers. Accessible by using your favorite Internet browser, the web site contains the following information:

- **Product Support** – Data sheets and errata, application notes and sample programs, design resources, user's guides and hardware support documents, latest software releases and archived software
- **General Technical Support** – Frequently Asked Questions (FAQs), technical support requests, online discussion groups, Microchip consultant program member listing
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- Distributor or Representative
- Local Sales Office
- Field Application Engineer (FAE)
- Technical Support

Customers should contact their distributor, representative or field application engineer (FAE) for support. Local sales offices are also available to help customers. A listing of sales offices and locations is included in the back of this document.

Technical support is available through the web site at:
http://www.microchip.com/support.

REVISION HISTORY

Revision A (April 2022)

- Original release of this document.

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Chapter 1. Product Overview

1.1 INTRODUCTION

This chapter provides an overview of the LX34211 Inductive Position Sensor Evaluation Boards/Kits, as well as a Quick Start Guide.

Start your next sensor development with a LX34211 Inductive Position Sensor Evaluation Boards/Kits for higher accuracy, immune to motor noise, and does not need a magnetic target. The sensor system consists of the inductive position sensor IC (LX34211), its printed circuit board sensor and the target. A target metal is attached to the moving mechanical housing, which provides position relative to the fixed position of sensor Printed Circuit Board (PCB).

LX34211 Inductive Position Sensor Evaluation Boards/Kits along with our free IPCE software allow you to evaluate, auto-calibrate and customize the sensors to your application needs.

LX34211 Inductive Position Sensor Evaluation Boards/Kits User's Guide is applicable for the following four boards:

- LX34211 360 Degree Rotary EVB (EV86J15A)
- LX34211 100 mm Linear EVB (EV56P59A)
- LX34211 360 Degree Rotary Kit (EV26W97A)
- LX34211 100 mm Linear Kit (EV31T07A)

1.2 FEATURES

LX34211 Inductive Position Sensor Evaluation Boards/Kits have the following features:

- Miniature sensor design with good output accuracy.
- Fully IPCE compatible (Programming, Calibration and Auto-detection in IPCE).

1.3 LX34211 INDUCTIVE POSITION SENSOR EVALUATION BOARDS/KITS CONTENTS

The Evaluation Kit contains the following items:

1. Inductive position sensor PCB with target assembly
2. Interfacing cable for the LXM9518 programmer
3. LXM9518 with USB cable to connect to PC (Kit only)
4. The IPCE software can be downloaded from www.microchip.com

Figure 1-1 shows a picture of LX34211 360 Degree Rotary EVB (EV86J15A).

Figure 1-2 shows a picture of LX34211 360 Degree Rotary Kit (EV26W97A).

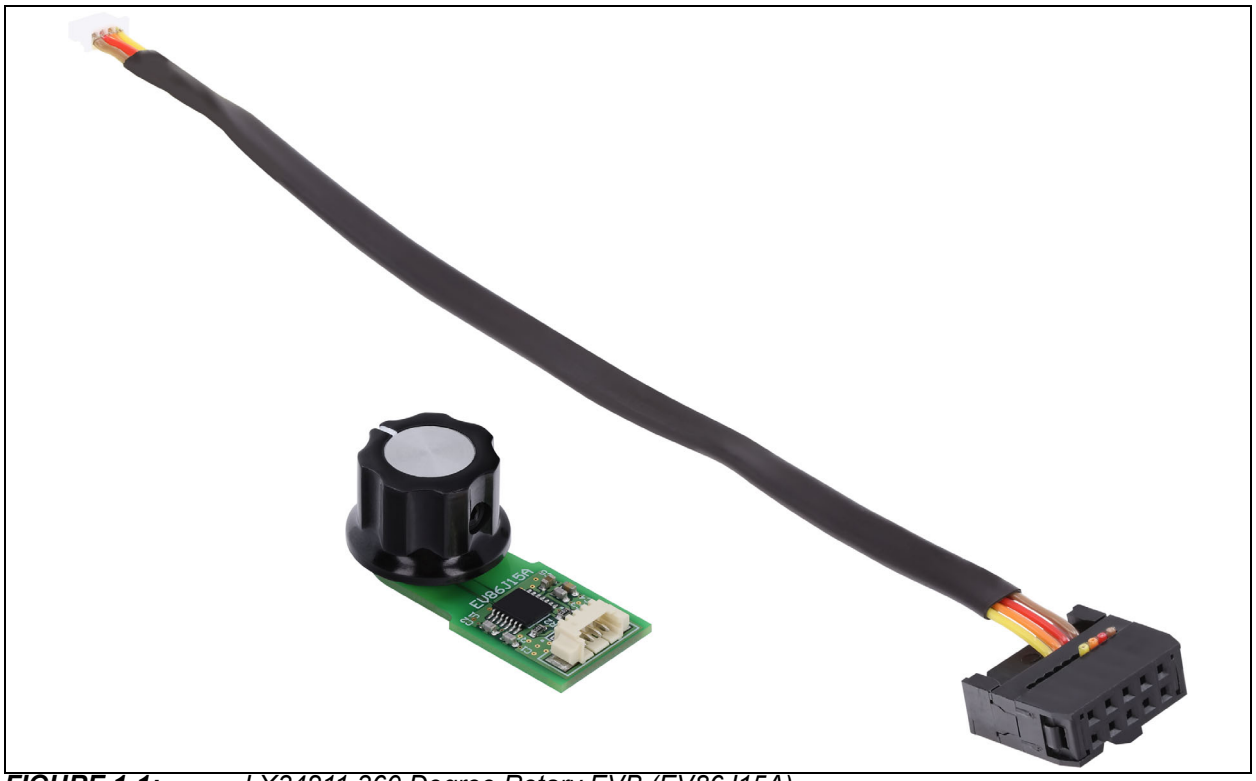

FIGURE 1-1: *LX34211 360 Degree Rotary EVB (EV86J15A).*

FIGURE 1-2: *LX34211 360 Degree Rotary Kit (EV26W97A).*

1.4 QUICK START GUIDE

LX34211 Inductive Position Sensor Evaluation Boards/Kits include an Integrated Programming and Calibration Environment (IPCE) to facilitate system calibration and configuration. The integrated programming environment contains an EEPROM programming tool and data measuring system.

Follow these steps to install and start operating the LX34211 Inductive Position Sensor Evaluation Boards/Kits:

1. To download the IPCE software, access the Sensor Evaluation and Calibration Software (2.x) from the LX34211 product page.
2. Install the program.
3. Connect LXM9518 programmer USB cable to PC and connect another end to Sensor Board using the supplied cable.
4. Open the installed IPCE program and, if required, follow the instructions shown on IPCE to update the firmware for LXM9518 programmer.
5. As the Inductive sensor IC is pre-loaded with Golden parameters and the programmer is updated with respective firmware, the IPCE will automatically detects the sensor and start displaying the live data of the sensor in the IPCE.
6. At this point, the sensor can be customized to the customer's needs. See the videos available on the web on how to use the IPCE to optimize the system performance.

NOTES:

Chapter 2. Technical Information

This chapter explains the key technical aspects of the LX34211 Inductive Position Sensor Evaluation Boards/Kits. It begins with a brief discussion of the system operation of the LX34211 Inductive Position Sensor Evaluation Boards/Kits, features a picture of the board and connector pinout instructions and concludes with an example diagram of linearity.

2.1 SYSTEM OPERATION

The LX34211 Inductive Position Sensor Evaluation Boards/Kits have been factory calibrated and are ready to use.

The EVB constitutes a main sensor board and a movable target PCB. The main sensor board contains two oscillator coils (OSC1 and OSC2) and two pickup coils (CL1 and CL2). The IC energizes the two oscillator coils. The position of the target varies the reception of the two pickup coils relative to each other. The IC demodulates the two received signals and generates an output signal (A_{OUT} and D_{OUT}) representative of the relative difference between the CL1 and CL2 signals, see Figure 2-1.

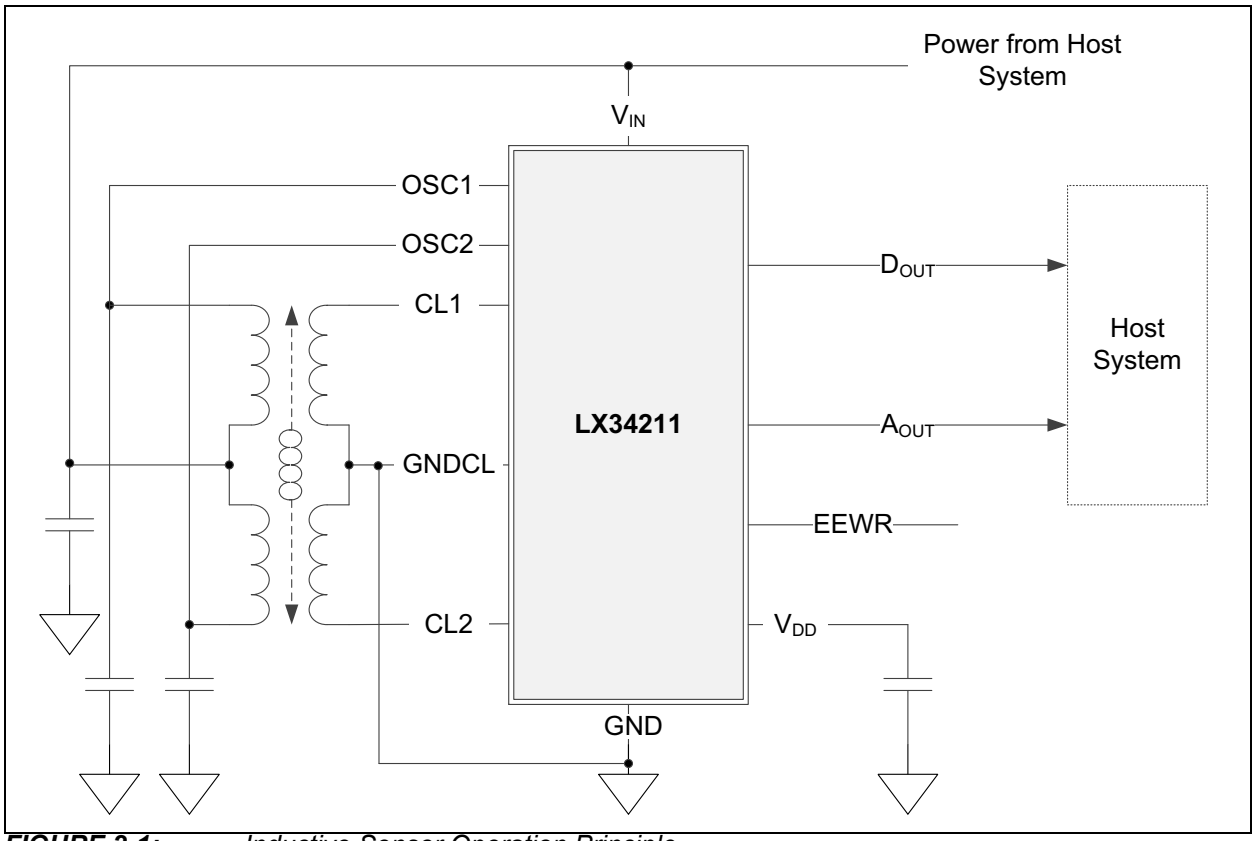

FIGURE 2-1: *Inductive Sensor Operation Principle.*

2.2 DETAILS OF CONNECTORS ON SENSOR BOARD

FIGURE 2-2: *LX34211 360 Degree Rotary EVB (EV86J15A).*

The sensor assembly comes with a 4-pin (CN1) to 10-pin connector for programming using LXM9518 programmer (Table 2-1 and Table 2-2 show the pinout of this connector).

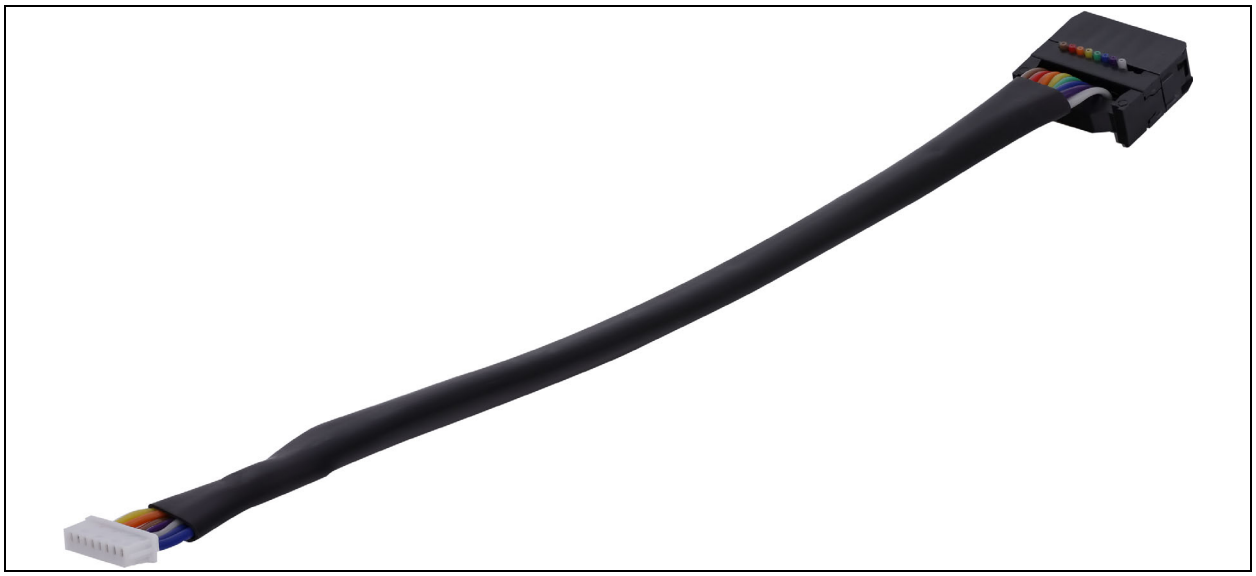

FIGURE 2-3: *4-pin (CN1) to 10-pin (CN2) Connector.*

TABLE 2-1: CN1 CONNECTOR PINOUT

Pin#	Pin Name	Functional Description
1	GND	Ground
2	V_{IN}	+5V Supply/Internal EEPROM programming.
3	A_{OUT}	A_{OUT} output can be programmed to Analog/PWM/TD
4	D_{OUT}	D_{OUT} output can be programmed to PWM/TD

TABLE 2-2: CN2 CONNECTOR PINOUT

Pin#	Pin Name	Functional Description
1	D_{OUT}	D_{OUT} output is the PWM/TD
2	A_{OUT}	A_{OUT} output is the Analog/PWM/TD
3	V_{IN}	+5V Supply/Internal EEPROM programming
4	GND	Ground
5	SDA	I^2C serial data (Internal purpose only, not for external use) Reserved
6	SCL	I^2C serial clock (Internal purpose only, not for external use) Reserved
7	IO1 (ICSPCLK)	Only used for digital programming mode (Clock for programming internal microcontroller)
8	IO4 (ICSPDAT)	Only used for digital programming mode (Data line for programming internal microcontroller)
9	MCLR	Master Clear (Used for programming internal microcontroller)
10	V_{DD}	Internal device supply

2.3 INDUCTIVE SENSOR BOARD TYPICAL CHARACTERISTICS

The plot in Figure 2-4 displays an example of linearity achievable with the inductive sensor with an analog output. Other output formats will have the same accuracy. The Error plot is the zoomed difference between the ideal slope (red) and the Analog output (blue).

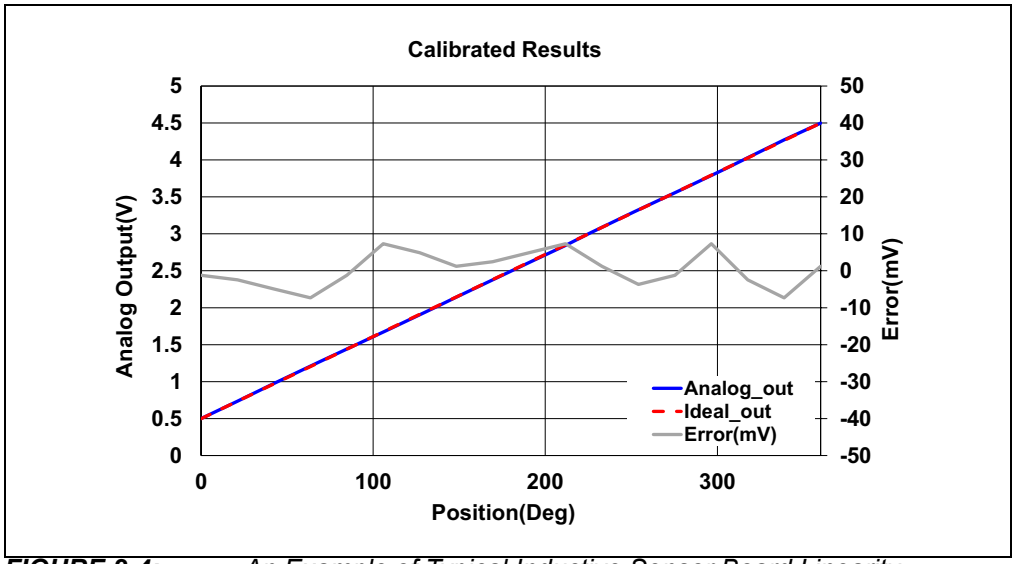

FIGURE 2-4: *An Example of Typical Inductive Sensor Board Linearity.*

NOTES:

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