

# **PWM 180-Pin Probing Board Manual**

**an EZ-Extender<sup>®</sup> product**

Revision 1.0, September 2013

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82-000387-01

Analog Devices, Inc.  
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## Regulatory Compliance

The PWM 180-Pin Probing Board is designed to be used solely in a laboratory environment. The board is not intended for use as a consumer end product or as a portion of a consumer end product. The board is an open system design which does not include a shielded enclosure and therefore may cause interference to other electrical devices in close proximity. This board should not be used in or near any medical equipment or RF devices.

The PWM 180-Pin Probing Board is in the process of being certified to comply with the essential requirements of the European EMC directive 2004/108/EC and therefore carries the “CE” mark.



The probing board contains ESD (electrostatic discharge) sensitive devices. Electrostatic charges readily accumulate on the human body and equipment and can discharge without detection. Permanent damage may occur on devices subjected to high-energy discharges. Proper ESD precautions are recommended to avoid performance degradation or loss of functionality. Store unused probing boards in the protective shipping package.





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# PREFACE

Thank you for purchasing the PWM 180-Pin Probing Board, Analog Devices, Inc. probing board for the ADSP-CM40x family of mixed-signal control processors.

The ADSP-CM408F mixed-signal control processor is based on the ARM<sup>®</sup> Cortex<sup>®</sup>-M4 processor core and is designed for motor control and industrial applications. The probing board is shipped with all of the necessary hardware—you can start the evaluation immediately.

## Product Overview

The PWM 180-Pin Probing Board is a separately sold extender board that plugs onto the ADSP-CM403F and ADSP-CM408F EZ-KIT Lite<sup>®</sup> evaluation systems. The extender board aids the design and prototyping phases of processor-targeted applications.

The board extends the capabilities of the evaluation system by providing a point for probing any signal of the 180-pin asynchronous bus and PWM expansion interface connectors.

The board features:

- Two 180-pin connectors
  - Samtec QSH-090-01-F-D-A
  - Samtec QTH-090-01-F-D-A

## Purpose of This Manual

- Five probing headers
  - Samtec TSW-118-07-L-D
- Ten GND headers
  - FCI 90726-402HLF

For information about the hardware components of the product, refer to [PWM 180-Pin Probing Board Bill Of Materials](#).

## Purpose of This Manual

The *PWM 180-Pin Probing Board Manual* provides instructions for installing the product hardware (board). A schematic and a bill of materials are provided for reference.

## Intended Audience

The primary audience for this manual is a programmer who is familiar with an ARM Cortex-M4-based core.

The ADSP-CM40x family of mixed-signal control processors is based on the ARM Cortex-M4 processor core with floating-point unit and integrated SRAM memory, flash memory, accelerators, and peripherals.

The applicable documentation for programming the ARM Cortex-M4 processor core includes:

- *Cortex-M4 Devices Generic User Guide*
- *CoreSight ETM-M4 Technical Reference Manual*
- *Cortex-M4 Technical Reference Manual*



For additional information on this Analog Devices processor, see the *ADSP-CM40x Mixed-Signal Control Processor Hardware Reference*. This document describes the ARM Cortex-M4 processor core and memory architecture used on the ADSP-CM40x processor, but does not provide detailed programming information for the ARM core.

For more information about programming the ARM core, visit the ARM Information Center:

<http://infocenter.arm.com/help/>

## Manual Contents

The manual consists of:

- Chapter 1, [Using PWM 180-Pin Probing Board](#)  
Describes the product functionality.
- Chapter 2, [PWM 180-Pin Probing Board Hardware Reference](#)  
Provides information about the board's hardware components.
- Appendix A, [PWM 180-Pin Probing Board Bill Of Materials](#)  
Lists the hardware components used to manufacture the board.
- Appendix B, [PWM 180-Pin Probing Board Schematic](#)  
Lists the resources for board-level debugging.

## What's New in This Manual

This is the first edition (Revision 1.0) of the *PWM 180-Pin Probing Board Manual*.

# Technical Support

You can reach Analog Devices processors and DSP technical support in the following ways:

- Post your questions in the processors and DSP support community at EngineerZone<sup>®</sup>:  
<http://ez.analog.com/community/dsp>
- Submit your questions to technical support directly at:  
<http://www.analog.com/support>
- E-mail your questions about processors and processor applications to:  
[processor.support@analog.com](mailto:processor.support@analog.com) or  
[processor.china@analog.com](mailto:processor.china@analog.com) (Greater China support)
- In the **USA only**, call **1-800-ANALOGD** (1-800-262-5643)
- Contact your Analog Devices sales office or authorized distributor. Locate one at:  
[www.analog.com/adi-sales](http://www.analog.com/adi-sales)
- Send questions by mail to:  
Processors and DSP Technical Support  
Analog Devices, Inc.  
Three Technology Way  
P.O. Box 9106  
Norwood, MA 02062-9106  
USA

## Supported Products

This board supports Analog Devices ADSP-CM403F and ADSP-CM408F EZ-KIT Lites.

## Product Information

Product information can be obtained from the Analog Devices Web site and the online help system.

## Analog Devices Web Site

The Analog Devices Web site, [www.analog.com](http://www.analog.com), provides information about a broad range of products—analogue integrated circuits, amplifiers, converters, and digital signal processors.

To access a complete technical library for each processor family, go to [http://www.analog.com/processors/technical\\_library](http://www.analog.com/processors/technical_library). The manuals selection opens a list of current manuals related to the product as well as a link to the previous revisions of the manuals. When locating your manual title, note a possible errata check mark next to the title that leads to the current correction report against the manual.

Also note, [myAnalog.com](http://myAnalog.com) is a free feature of the Analog Devices Web site that allows customization of a Web page to display only the latest information about products you are interested in. You can choose to receive weekly e-mail notifications containing updates to the Web pages that meet your interests, including documentation errata against all manuals. [myAnalog.com](http://myAnalog.com) provides access to books, application notes, data sheets, code examples, and more.

Visit [myAnalog.com](http://myAnalog.com) (found on the Analog Devices home page) to sign up. If you are a registered user, just log on. Your user name is your e-mail address.

## Notation Conventions

### EngineerZone




EngineerZone is a technical support forum from Analog Devices. It allows you direct access to ADI technical support engineers. You can search FAQs and technical information to get quick answers to your embedded processing and DSP design questions.

Use EngineerZone to connect with other DSP developers who face similar design challenges. You can also use this open forum to share knowledge and collaborate with the ADI support team and your peers. Visit <http://ez.analog.com> to sign up.

## Notation Conventions

Text conventions used in this manual are identified and described as follows.

Example	Description
<b>File &gt; Close</b>	Titles in reference sections indicate the location of an item within the CCES environment's menu system (for example, the <b>Close</b> command appears on the <b>File</b> menu).
{this   that}	Alternative required items in syntax descriptions appear within curly brackets and separated by vertical bars; read the example as <i>this</i> or <i>that</i> . One or the other is required.
[this   that]	Optional items in syntax descriptions appear within brackets and separated by vertical bars; read the example as an optional <i>this</i> or <i>that</i> .
[this,...]	Optional item lists in syntax descriptions appear within brackets delimited by commas and terminated with an ellipse; read the example as an optional comma-separated list of <i>this</i> .
.SECTION	Commands, directives, keywords, and feature names are in text with letter gothic font.
<i>filename</i>	Non-keyword placeholders appear in text with italic style format.

Example	Description
	<p><b>Note:</b> For correct operation, ...</p> <p>A Note provides supplementary information on a related topic. In the online version of this book, the word <b>Note</b> appears instead of this symbol.</p>
	<p><b>Caution:</b> Incorrect device operation may result if ...</p> <p><b>Caution:</b> Device damage may result if ...</p> <p>A Caution identifies conditions or inappropriate usage of the product that could lead to undesirable results or product damage. In the online version of this book, the word <b>Caution</b> appears instead of this symbol.</p>
	<p><b>Warning:</b> Injury to device users may result if ...</p> <p>A Warning identifies conditions or inappropriate usage of the product that could lead to conditions that are potentially hazardous for the devices users. In the online version of this book, the word <b>Warning</b> appears instead of this symbol.</p>

## Notation Conventions

# 1 USING PWM 180-PIN PROBING BOARD

This chapter provides information about using the PWM 180-Pin Probing Board.

The following topics are covered.

- [Package Contents](#)
- [PWM 180-Pin Probing Board Installation](#)
- [Expansion Interface](#)
- [Reference Design Information](#)

For detailed information on how to program the ADSP-CM40x processors, refer to the documents listed in the [Preface](#).

For detailed information about the specific evaluation system, refer to the *ADSP-CM403F EZ-KIT Lite Evaluation System Manual* or the *ADSP-CM408F EZ-KIT Lite Evaluation System Manual*.

# Package Contents

Your PWM 180-Pin Probing Board package contains the following items:

- PWM 180-Pin Probing Board
- Hardware for securing the extender board onto the EZ-KIT Lite

Contact the vendor where you purchased your EZ-KIT Lite or contact Analog Devices, Inc. if any item is missing.

## PWM 180-Pin Probing Board Installation

Follow these instructions to ensure correct operation of the product hardware.

1. Attach the extender board to the EZ-KIT Lite.

The P1 connector on the extender board can be connected to the corresponding 180-pin connector on the EZ-KIT Lite.

2. Use the provided hardware to secure the extender to the EZ-KIT Lite.



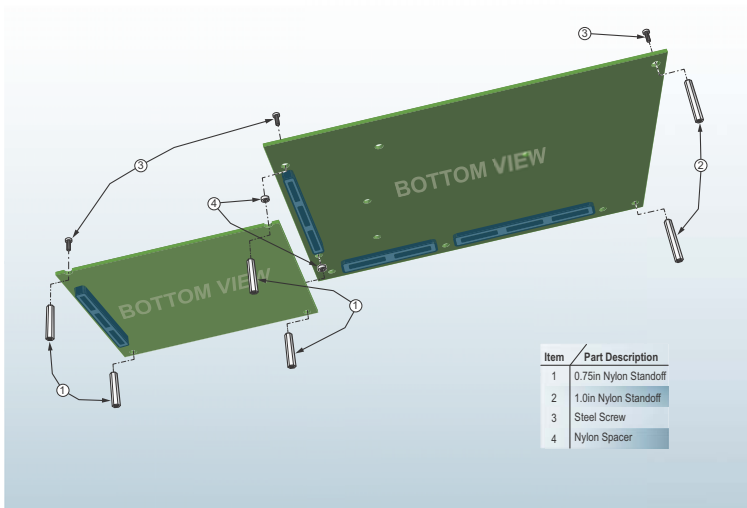



Figure 1-1. Mechanical Mating Details

## Expansion Interface

The expansion interface allows a custom-designed daughter board to be tested across various hardware platforms that have the same expansion interface.

The expansion interface implemented on the ADSP-CM40x EZ-KIT Lites consists of two 180-pin connectors. The connectors contain a majority of the processor's signals. There is also a 120-pin connector for Analog signals. The PWM 180-Pin Probing Board will not mate with the 120-pin connectors.

 Analog Devices does not support and is not responsible for the effects of additional circuitry.

# Reference Design Information

A reference design info package is available for download on the Analog Devices Web site. The package provides information on the design, layout, fabrication, and assembly of the probing board.

The information can be found at:

<http://www.analog.com/MCEI1-PWMProbingBoard>

# 2 PWM 180-PIN PROBING BOARD HARDWARE REFERENCE

This chapter describes the hardware design of the PWM 180-Pin Probing Board.

The following topics are covered.

- [System Architecture](#)  
Describes the board's configuration and explains how the board components interface with the processor.
- [Connectors](#)  
Shows the locations and provides part numbers for the on-board connectors. In addition, the manufacturer and part number information is provided for the mating parts.

## System Architecture

The PWM 180-Pin Probing Board allows all signals to be probed. Silkscreen on the board corresponds with the pin number of the QTH-090-01-F-D-A (P1) connector. These numbers also match one-to-one with the QSH-090-01-F-D-A (JX) connector located on the attached EZ-KIT Lite.

It is also possible to connect the PWM 180-Pin Probing Board in between the EZ-KIT Lite and an extender card with additional circuitry. To do this, connect P1 of the extender card to the EZ-KIT Lite and attach the extender card to J1 of the PWM 180-Pin Probing Board.

## Connectors

This section describes connector functionality and provides information about mating connectors. The connector locations are shown in [Figure 2-1](#).

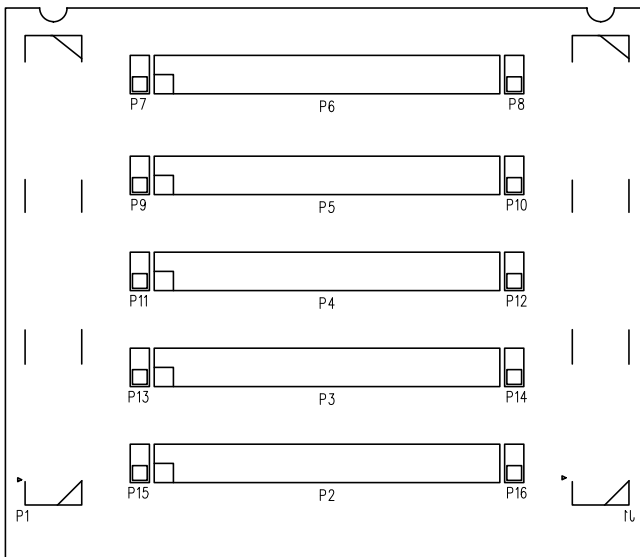


Figure 2-1. Connector Locations

## Connector (J1)

Part Description	Manufacturer	Part Number
180-pin high speed socket	SAMTEC	QSH-090-01-F-D-A
<b>Mating Connector</b>		
180-pin high speed header	SAMTEC	QTH-090-01-F-D-A

## Connector (P1)

Part Description	Manufacturer	Part Number
180-pin high speed header	SAMTEC	QTH-090-01-F-D-A
<b>Mating Connector</b>		
180-pin high speed socket	SAMTEC	QSH-090-01-F-D-A

## Connector (P2–P6)

Part Description	Manufacturer	Part Number
IDC 18x2 0.1"	SAMTEC	TSW-118-07-L-D
<b>Mating Connector</b>		
0.1" female connector with wire or oscilloscope probe		

## Connector (P7–P16)

Part Description	Manufacturer	Part Number
IDC 2x1 0.1"	FCI	90726-402HLF
<b>Mating Connector</b>		
0.1" oscilloscope probe GND		

## Connectors

# A PWM 180-PIN PROBING BOARD BILL OF MATERIALS

The bill of materials corresponds to [PWM 180-Pin Probing Board Schematic](#).

Ref.	Qty	Description	Reference Designator	Manufacturer	Part Number
1	10	IDC 2X1 IDC2X1	P7-P16	FCI	90726-402HLF
2	1	0.5MM 180PIN SAMTEC_ QSH-090-F-D-A	J1	SAMTEC	QSH-090-01-F-D-A
3	1	0.5MM 180PIN SAMTEC_ QTH-090-F-D-A	P1	SAMTEC	QTH-090-01-F-D-A
4	5	IDC 18X2 SAMTEC_ TSW-118-07-L-D	P2-P6	SAMTEC	TSW-118-07-L-D





A

B

C

D

1

1

2

2

3

3

4

4

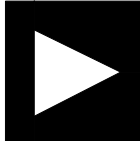
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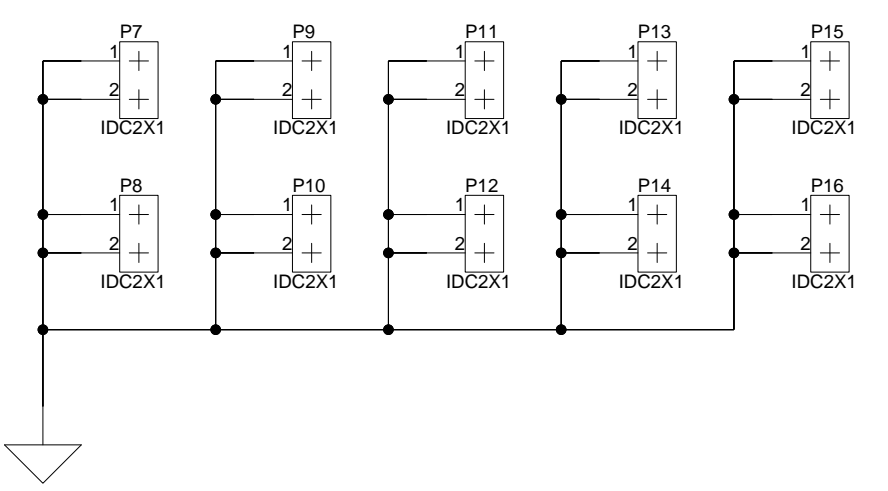
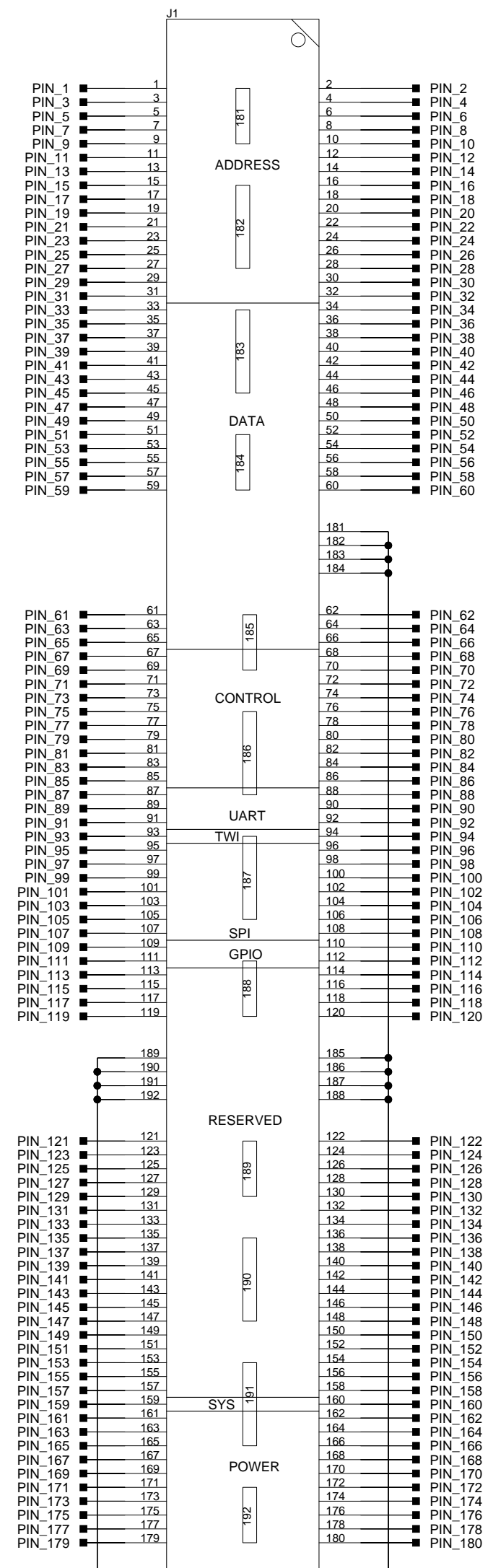
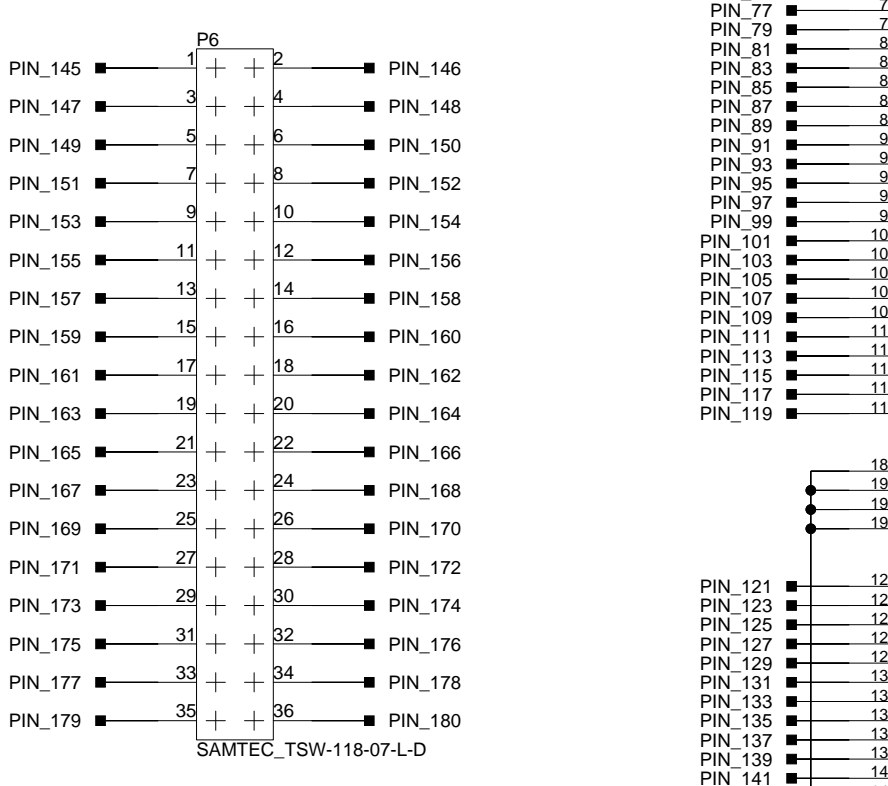
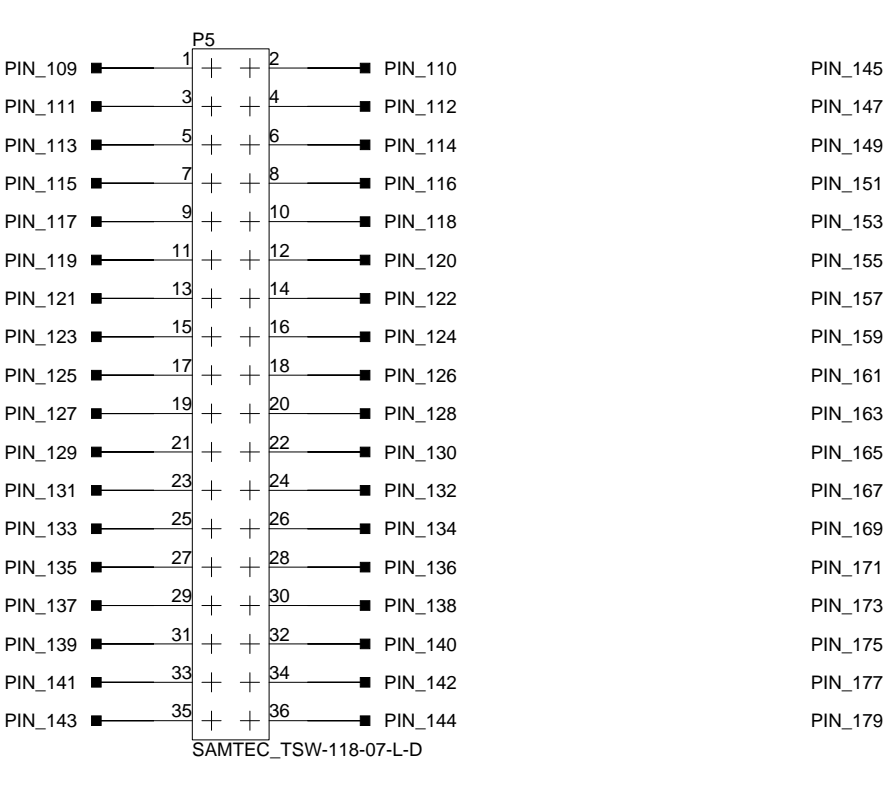
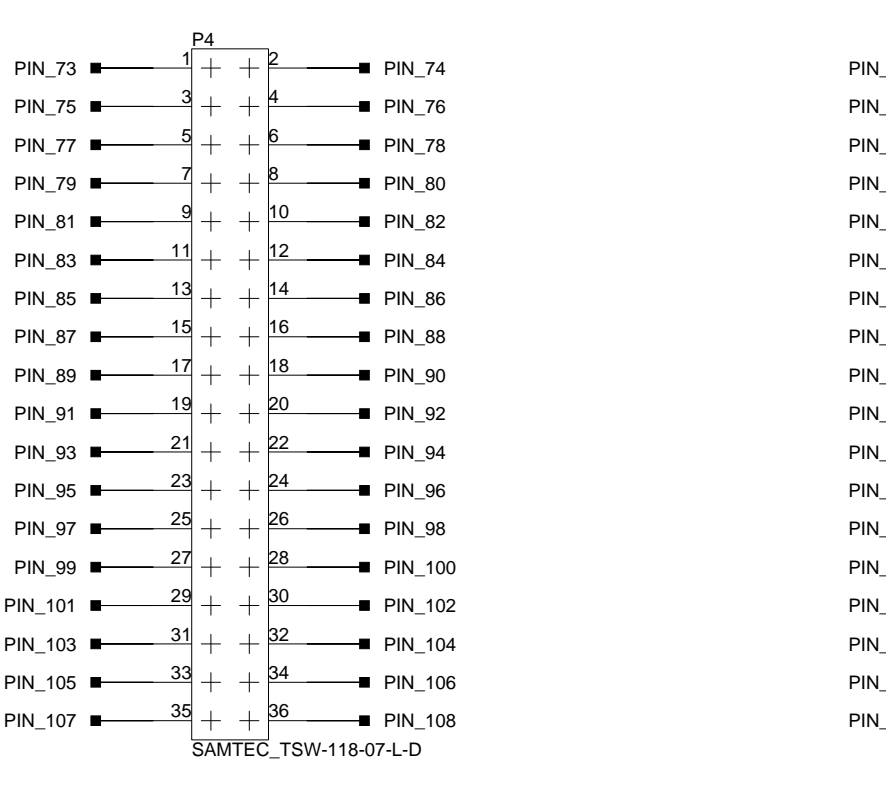
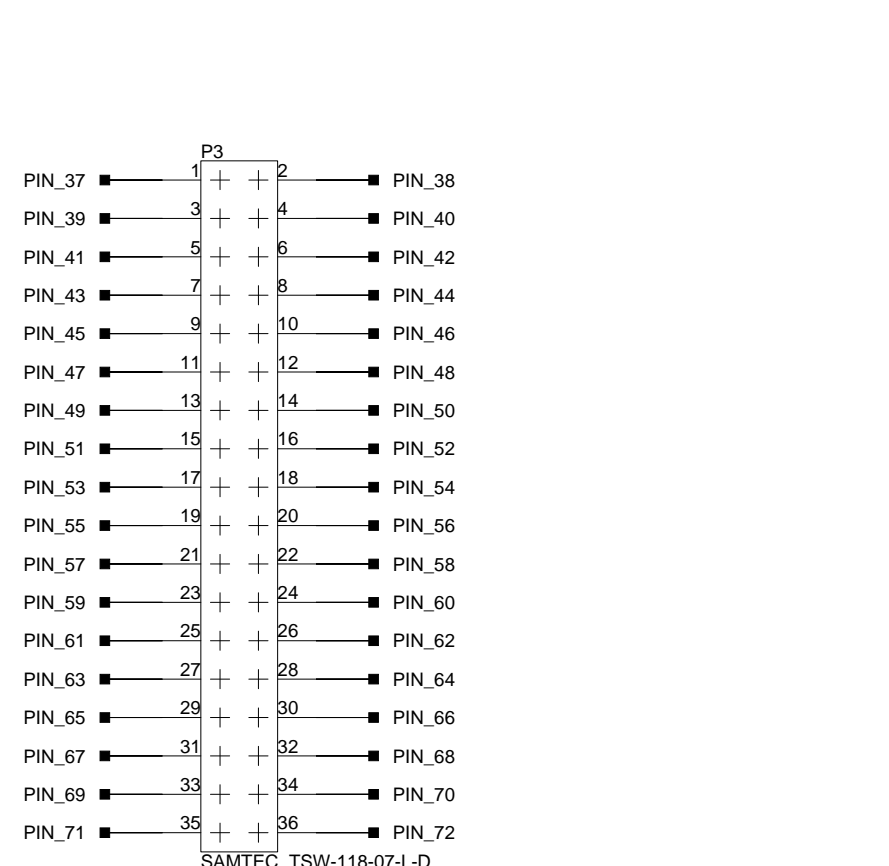
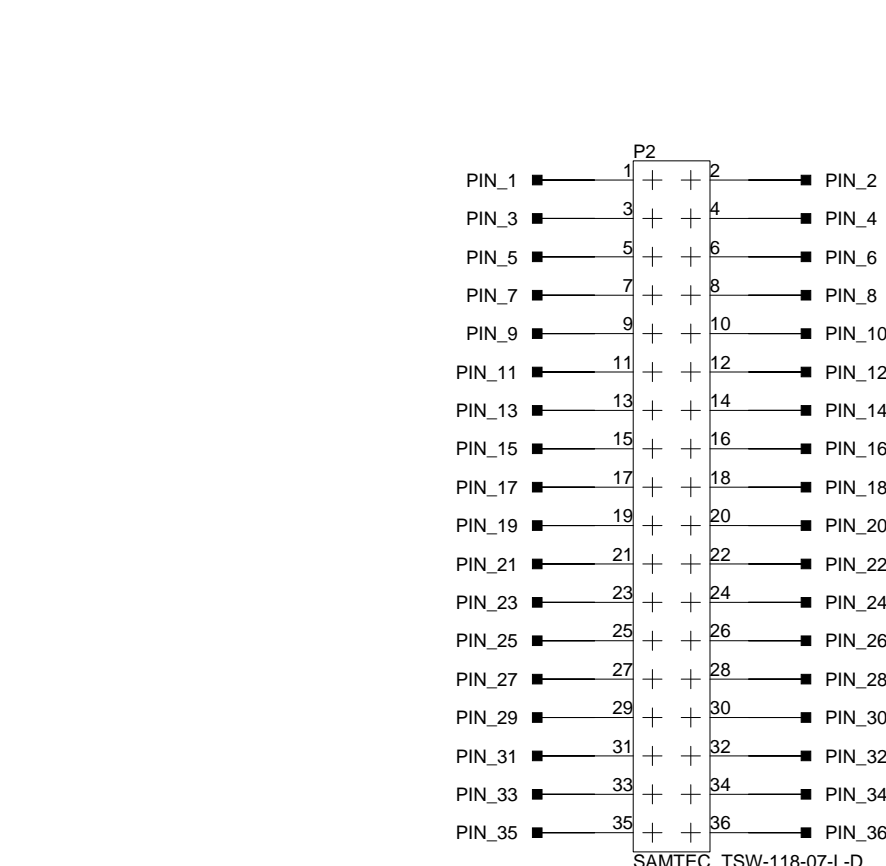
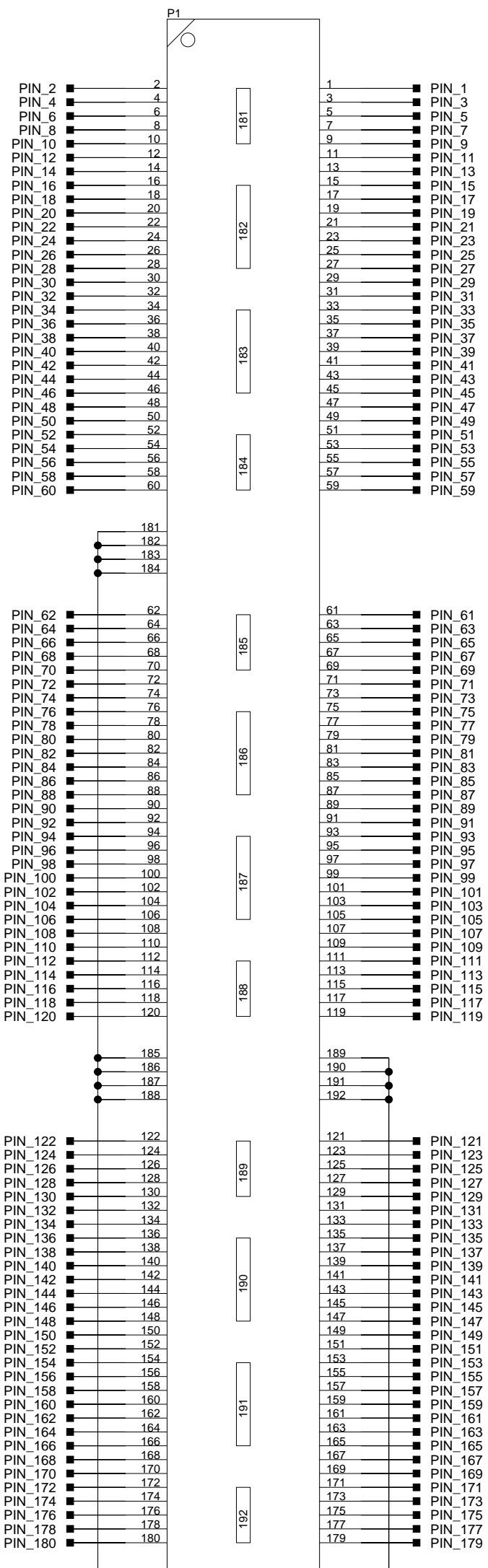
B

C

D

# PWM 180-PIN PROBING BOARD

		<b>ANALOG DEVICES</b>	20 Cotton Road Nashua, NH 03063 PH: 1-800-ANALOGD
<b>Title</b>		PWM 180-PIN PROBING BOARD Title	
<b>Size</b> C	<b>Board No.</b>	A0387-2012	<b>Rev</b> 0.1
<b>Date</b>	09/25/2012	<b>Sheet</b>	1 of 2



**ANALOG DEVICES**

20 Cotton Road  
Nashua, NH 03063  
PH: 1-800-ANALOGD

Title <b>PWM 180-PIN PROBING BOARD Connectors</b>			
Size C	Board No. <b>A0387-2012</b>	Rev <b>0.1</b>	
Date	09/25/2012	Sheet	2 of 2

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