

## ADF7030-1 EZ-KIT User Guide

### EVALUATION KIT CONTENTS

Two **ADF7030-1** daughter boards (**EV-ADF70301-915AZ**, **EV-ADF70301-868BZ**, **EV-ADF70301-433AZ**, or **EV-ADF70301-169BZ**)

Two antennae

Two **ADuCM3029 EZ-KIT** boards (**ADZS-UCM3029EZLITE**)

Two LCD shield boards for the **ADuCM3029 EZ-KIT** board

Two 3.6 V batteries

Three USB cables

One J-Link Lite emulator

One universal 5 V dc power supply

### SOFTWARE AND EQUIPMENT NEEDED

**ADF7xxx EZ-KIT Design Suite**

Contains the **ADF7030-1** Design Center, a powerful tool for evaluation, performance analysis, and configuration of the **ADF7030-1**

**IAR Embedded Workbench® and Segger®**

For embedded development and debug with the **ADuCM3029** and the **ADF7030-1**

### GENERAL DESCRIPTION

The **ADF7030-1 EZ-KIT®** is an evaluation and development system for the **ADF7030-1** high performance, sub-GHz, RF transceiver. Four EZ-KIT models are available for the **ADF7030-1**, covering various frequency ranges (see Table 1).

Each **ADF7030-1 EZ-KIT** allows fast and thorough evaluation of the **ADF7030-1** radio and provides a platform for host processor code development using the **ADuCM3029 EZ-KIT** mother board (**ADZS-UCM3029EZLITE**).

The **ADF7030-1 EZ-KIT** consists of the following:

- RF daughter boards.
- Antennae for over the air packet error rate testing.
- **ADuCM3029 EZ-KIT** mother board and LCD shield for evaluation and development with the **ADF7030-1**. The **ADF7030-1** daughter boards plug into this mother board.
- **ADF7030-1** Design Center, a graphical user interface (GUI) for evaluation of the **ADF7030-1**. The GUI can be used for configuring the **ADF7030-1**, evaluating transmit and receive operation, and transmitting and receiving packets.

Table 1. Available **ADF7030-1 EZ-KIT** Models

Model	Frequency
<b>ADF70301-915EZKIT</b>	902 MHz to 928 MHz
<b>ADF70301-868EZKIT</b>	863 MHz to 876 MHz
<b>ADF70301-433EZKIT</b>	433 MHz to 434 MHz
<b>ADF70301-169EZKIT</b>	169 MHz

### ADF7030-1 EZ-KIT PHOTOGRAPH



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Figure 1.

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REVISION HISTORY

6/2016—Revision 0: Initial Version

## EVALUATION KIT CONTENTS

Table 2 describes the items common to every [ADF7030-1 EZ-KIT](#), while the items unique to each EZ-KIT are described in Table 3, Table 4, Table 5, and Table 6.

**Table 2. Items Common to Every [ADF7030-1 EZ-KIT](#)**

Item	Qty	Description
<a href="#">ADZ5-UCM3029EZLITE</a>	2	<a href="#">ADuCM3029 EZ-KIT</a> board. This is the mother board to which the <a href="#">ADF7030-1</a> daughter board connects.
LCD adapter board	2	LCD shield board for the <a href="#">ADuCM3029 EZ-KIT</a> board.
Saft LS14250	2	3.6 V primary lithium-thionyl chloride (Li-SOCl <sub>2</sub> ) battery for powering the <a href="#">ADuCM3029 EZ-KIT</a> board when not connected to the PC.
USB cable	3	Used to connect the <a href="#">ADuCM3029 EZ-KIT</a> board to the PC for use with the <a href="#">ADF7030-1</a> evaluation software. Also provides power to both the <a href="#">ADuCM3029 EZ-KIT</a> and the <a href="#">ADF7030-1</a> daughter board.
J-Link Lite emulator	1	Provides serial wire debug capabilities for the <a href="#">ADuCM3029</a> .
Universal 5 V dc power supply	1	Alternative option to the USB for powering the <a href="#">ADuCM3029 EZ-KIT</a> and the <a href="#">ADF7030-1</a> daughter board.

**Table 3. Items Unique to [ADF70301-915EZKIT](#)**

Item	Qty	Description
<a href="#">EV-ADF70301-915AZ</a>	2	<a href="#">ADF7030-1</a> daughter boards. See Table 7 for further details.
ANT-916-CW-HWR-SMA	2	Quarter wavelength whip monopole antenna from Linx Technologies, Inc. Frequency range = 900 MHz to 930 MHz.

**Table 4. Items Unique to [ADF70301-868EZKIT](#)**

Item	Qty	Description
<a href="#">EV-ADF70301-868BZ</a>	2	<a href="#">ADF7030-1</a> daughter boards. See Table 7 for further details.
ANT-868-CW-HWR-SMA	2	Quarter wavelength whip monopole antenna from Linx Technologies. Frequency range = 853 MHz to 883 MHz.

**Table 5. Items Unique to [ADF70301-433EZKIT](#)**

Item	Qty	Description
<a href="#">EV-ADF70301-433AZ</a>	2	<a href="#">ADF7030-1</a> daughter boards. See Table 7 for further details.
ANT-433-CW-HWR-SMA	2	Quarter wavelength whip monopole antenna from Linx Technologies. Frequency range = 418 MHz to 448 MHz.

**Table 6. Items Unique to [ADF70301-169EZKIT](#)**

Item	Qty	Description
<a href="#">EV-ADF70301-169BZ</a>	2	<a href="#">ADF7030-1</a> daughter boards. See Table 7 for further details.
FW.80.SMA.M	2	Quarter wavelength whip monopole antenna from Taoglas. Frequency range = 169 MHz.

## HARDWARE

### ADUCM3029 MOTHER BOARD

A block diagram of the ADuCM3029 mother board is shown in Figure 2. The ADuCM3029 EZ-KIT user guide and board design database is available from the Analog Devices website at [www.analog.com/ADuCM3029EZKIT](http://www.analog.com/ADuCM3029EZKIT).

### ADF7030-1 DAUGHTER BOARDS

Although ADF7030-1 daughter boards are included in the ADF7030-1 EZ-KIT, the boards are also available individually.

The daughter boards plug into the ADuCM3029 mother board, which also comes with the ADF7030-1 EZ-KIT.

The available daughter boards are described in Table 7.

Details on the schematic, layout, and bill of material for each of these boards can be found in the ADF7030-1 design package available at [www.analog.com/ADF7030-1](http://www.analog.com/ADF7030-1).

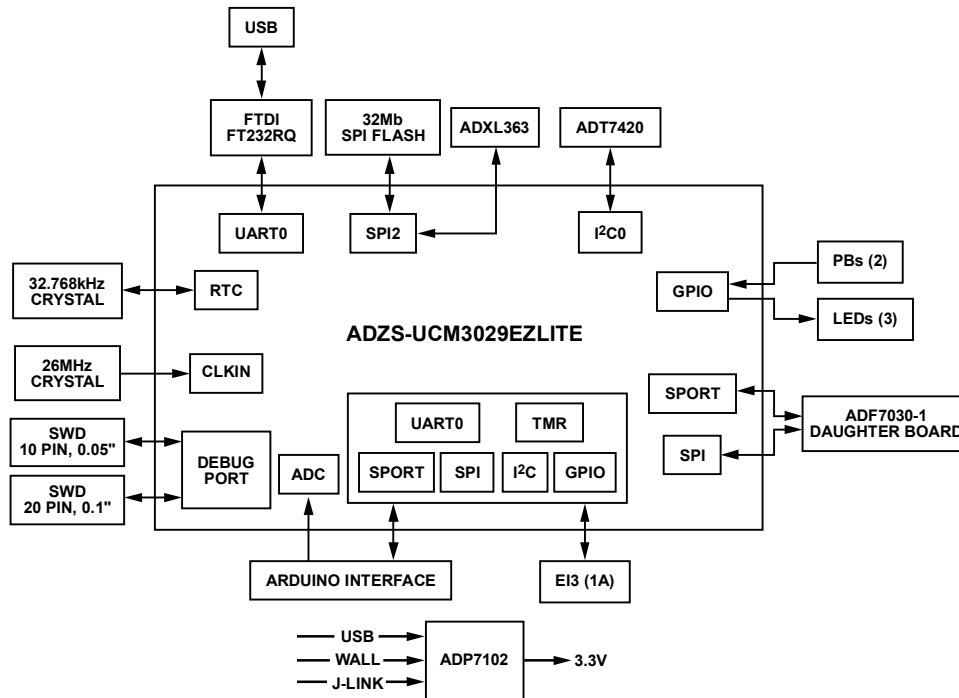


Figure 2. ADuCM3029 EZ-KIT (Mother Board for the ADF7030-1 Daughter Board) Block Diagram

Table 7. ADF7030-1 Daughter Boards

Model	ADF7030-1 Package	RF Match Frequency Range (MHz)	26 MHz Reference Oscillator Type	Matching Topology	Frequency of Included Antenna (MHz)	Printed Circuit Board (PCB) Layout Name
<a href="#">EV-ADF70301-915AZ</a>	40-pin LFCSP	862 to 928	XTAL	Separate PA and LNA match	902 to 928	ADF703x40Sxxx
<a href="#">EV-ADF70301-868BZ</a>	40-pin LFCSP	862 to 928	TCXO	Separate PA and LNA match	863 to 876	ADF703x40Sxxx
<a href="#">EV-ADF70301-460BZ</a>	40-pin LFCSP	450 to 470	TCXO	Separate PA and LNA match	Not included	ADF703x40Sxxx
<a href="#">EV-ADF70301-433AZ</a>	40-pin LFCSP	433 to 434	XTAL	Separate PA and LNA match	433 to 434	ADF703x40Sxxx
<a href="#">EV-ADF70301-169BZ</a>	40-pin LFCSP	169	TCXO	Separate PA and LNA match	Not included	EV-ADF70301-169

## HARDWARE SETUP FOR EVALUATION

### CONNECTING THE DAUGHTER BOARD

The [ADF7030-1](#) daughter board plugs into the P1, P2, and P3 headers on the [ADuCM3029](#) mother board. Ensure that the mother board is powered down before connecting the daughter board. Take care when connecting and disconnecting the two boards to avoid damaging the headers on each of the boards.

### ADF7030-1 DAUGHTER BOARD J4 HEADER

In addition to the main P1, P2, and P3 connection header, the [ADF7030-1](#) daughter board also provides a secondary header that exposes the interface connections between the host processor ([ADuCM3029](#)) and the [ADF7030-1](#), as well as VDD and GND. This header provides a useful debug header and also allows the [ADF7030-1](#) daughter board to connect to other host processor mother boards. If using this header as the main communication interface to the [ADF7030-1](#) (instead of using P1, P2, and P3), populate C3 on the [ADF7030-1](#) daughter board with a 10  $\mu$ F capacitor.

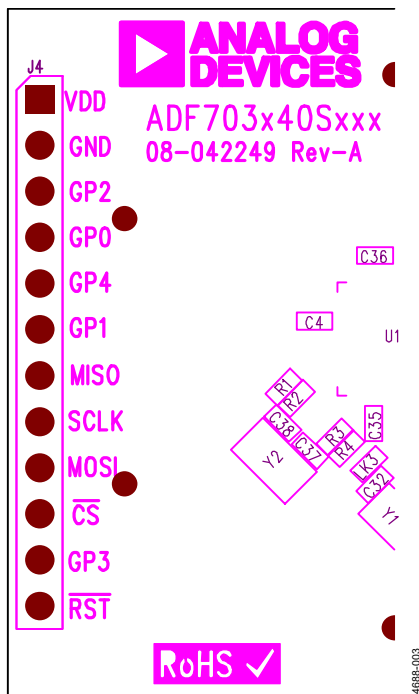


Figure 3. J4 Header on the [ADF7030-1](#) Daughter Board

### USB CONNECTION

The mini USB connection (P6) on the [ADuCM3029](#) mother board is the main USB communication port connection. This port has the following functions:

- Provides the main COM port for the [ADF7030-1](#) evaluation software.
- Is used for uploading the firmware image code to the [ADuCM3029](#).
- Provides power to the entire [ADuCM3029](#) mother board.

### POWER OPTIONS

#### Power from USB

The USB is the default option for providing power to the [ADuCM3029](#) mother board and the [ADF7030-1](#) daughter board.

## SOFTWARE

### ADF7030-1 DESIGN CENTER

The [ADF7030-1](#) Design Center is a powerful software tool for evaluation, performance analysis, and configuration of the [ADF7030-1](#). It provides a GUI for configuring the [ADF7030-1](#), evaluating transmit and receive operation, and transmitting and receiving packets.

#### Installation

Download the ADF7xxx EZ-KIT Design Suite from [www.analog.com/EVAL-ADF7030-1EZ-KIT](http://www.analog.com/EVAL-ADF7030-1EZ-KIT). After downloading, double-click the executable to begin the installation. Follow the on-screen prompts until the installation is complete.

#### Setup

Use the following procedure to set up the evaluation kit:

1. After installing the ADF7xxx EZ-KIT Design Suite software, ensure that the [ADF7030-1](#) daughter board is plugged into the [ADuCM3029](#) mother board. Plug the USB cable into the mini USB port (P6) on the [ADuCM3029](#) mother board, and plug the other end of the cable into the PC on which the software is installed.
2. Start the ADF7xxx EZ-KIT Design Suite software. From the **Start** menu, go to **All Programs, Analog Devices, ADF7xxx EZ-KIT Design Suite**, and click **ADF7xxx EZ-KIT Design Suite**.
3. The ADF7xxx EZ-KIT Design Suite start screen appears when the program is opened.
4. From the main screen, the user can select the relevant device to evaluate. In this case, select the [ADF7030-1](#).
5. After selecting which device to connect with, a new screen appears with a list of boards to connect with, depending on the number of [ADuCM3029](#) mother boards plugged into the PC. Each of the boards connected to the PC has a board number displayed on the LCD screen. Select one of the boards from the list to connect to, and then click **OK** to begin evaluation in the [ADF7030-1](#) Design Center.

### EMBEDDED DEVELOPMENT

The ADuCM302x EZ-KIT board support package (BSP) provides software and documentation in support of the [ADuCM3029](#) mother board. It is available for download from [www.analog.com/ADuCM3029EZKIT](http://www.analog.com/ADuCM3029EZKIT).

The [ADuCM3029](#) mother board works with the IAR Embedded Workbench software development tools. For more details on IAR, see the IAR website.

The BSP provides comprehensive software support for the [ADuCM3029](#) mother board, which includes drivers and services that demonstrate the on-chip drivers and services. The device driver and services documentation is part of the BSP.

## FURTHER INFORMATION

This user guide describes the contents and setup of the [ADF7030-1 EZ-KIT](#). For more information, the following resources are available.

### ADF7030-1 DESIGN PACKAGE

The [ADF7030-1](#) design package is a complete documentation and resource package for the [ADF7030-1](#). It is recommended to download this package from [www.analog.com/ADF7030-1](http://www.analog.com/ADF7030-1) as a starting point for evaluation and development. The design package contains manuals, application notes, hardware information, and firmware modules.

### ADF7030-1 DATA SHEET

The [ADF7030-1](#) data sheet contains complete specifications and typical performance information for the [ADF7030-1](#).

### ADF7030-1 SOFTWARE REFERENCE MANUAL (UG-1002)

The [ADF7030-1](#) software reference manual ([UG-1002](#)) is the detailed programming guide for the [ADF7030-1](#). This document provides a detailed description of how to control the [ADF7030-1](#) transceiver from the host microcontroller. It is intended as a resource for a firmware engineer developing host microcontroller firmware to communicate with the [ADF7030-1](#).

### ADF7030-1 HARDWARE REFERENCE MANUAL (UG-957)

The [ADF7030-1](#) hardware reference manual ([UG-957](#)) provides a description of the [ADF7030-1](#) radio functionality, hardware features, and application circuit requirements. It is intended as a resource for a hardware engineer designing a PCB that includes the [ADF7030-1](#).



#### ESD Caution

**ESD (electrostatic discharge) sensitive device.** Charged devices and circuit boards can discharge without detection. Although this product features patented or proprietary protection circuitry, damage may occur on devices subjected to high energy ESD. Therefore, proper ESD precautions should be taken to avoid performance degradation or loss of functionality.

#### Legal Terms and Conditions

By using the evaluation board discussed herein (together with any tools, components documentation or support materials, the "Evaluation Board"), you are agreeing to be bound by the terms and conditions set forth below ("Agreement") unless you have purchased the Evaluation Board, in which case the Analog Devices Standard Terms and Conditions of Sale shall govern. Do not use the Evaluation Board until you have read and agreed to the Agreement. Your use of the Evaluation Board shall signify your acceptance of the Agreement. This Agreement is made by and between you ("Customer") and Analog Devices, Inc. ("ADI"), with its principal place of business at One Technology Way, Norwood, MA 02062, USA. Subject to the terms and conditions of the Agreement, ADI hereby grants to Customer a free, limited, personal, temporary, non-exclusive, non-sublicensable, non-transferable license to use the Evaluation Board FOR EVALUATION PURPOSES ONLY. Customer understands and agrees that the Evaluation Board is provided for the sole and exclusive purpose referenced above, and agrees not to use the Evaluation Board for any other purpose. Furthermore, the license granted is expressly made subject to the following additional limitations: Customer shall not (i) rent, lease, display, sell, transfer, assign, sublicense, or distribute the Evaluation Board; and (ii) permit any Third Party to access the Evaluation Board. As used herein, the term "Third Party" includes any entity other than ADI, Customer, their employees, affiliates and in-house consultants. The Evaluation Board is NOT sold to Customer; all rights not expressly granted herein, including ownership of the Evaluation Board, are reserved by ADI. CONFIDENTIALITY. This Agreement and the Evaluation Board shall all be considered the confidential and proprietary information of ADI. Customer may not disclose or transfer any portion of the Evaluation Board to any other party for any reason. Upon discontinuation of use of the Evaluation Board or termination of this Agreement, Customer agrees to promptly return the Evaluation Board to ADI. ADDITIONAL RESTRICTIONS. Customer may not disassemble, decompile or reverse engineer chips on the Evaluation Board. Customer shall inform ADI of any occurred damages or any modifications or alterations it makes to the Evaluation Board, including but not limited to soldering or any other activity that affects the material content of the Evaluation Board. Modifications to the Evaluation Board must comply with applicable law, including but not limited to the RoHS Directive. TERMINATION. ADI may terminate this Agreement at any time upon giving written notice to Customer. Customer agrees to return to ADI the Evaluation Board at that time. LIMITATION OF LIABILITY. THE EVALUATION BOARD PROVIDED HEREUNDER IS PROVIDED "AS IS" AND ADI MAKES NO WARRANTIES OR REPRESENTATIONS OF ANY KIND WITH RESPECT TO IT. ADI SPECIFICALLY DISCLAIMS ANY REPRESENTATIONS, ENDORSEMENTS, GUARANTEES, OR WARRANTIES, EXPRESS OR IMPLIED, RELATED TO THE EVALUATION BOARD INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTY OF MERCHANTABILITY, TITLE, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF INTELLECTUAL PROPERTY RIGHTS. IN NO EVENT WILL ADI AND ITS LICENSORS BE LIABLE FOR ANY INCIDENTAL, SPECIAL, INDIRECT, OR CONSEQUENTIAL DAMAGES RESULTING FROM CUSTOMER'S POSSESSION OR USE OF THE EVALUATION BOARD, INCLUDING BUT NOT LIMITED TO LOST PROFITS, DELAY COSTS, LABOR COSTS OR LOSS OF GOODWILL. ADI'S TOTAL LIABILITY FROM ANY AND ALL CAUSES SHALL BE LIMITED TO THE AMOUNT OF ONE HUNDRED US DOLLARS (\$100.00). EXPORT. Customer agrees that it will not directly or indirectly export the Evaluation Board to another country; and that it will comply with all applicable United States federal laws and regulations relating to exports. GOVERNING LAW. This Agreement shall be governed by and construed in accordance with the substantive laws of the Commonwealth of Massachusetts (excluding conflict of law rules). Any legal action regarding this Agreement will be heard in the state or federal courts having jurisdiction in Suffolk County, Massachusetts, and Customer hereby submits to the personal jurisdiction and venue of such courts. The United Nations Convention on Contracts for the International Sale of Goods shall not apply to this Agreement and is expressly disclaimed.