

Evaluating the ADP1034 3-Channel, Isolated Micropower Management Unit with Seven Digital Isolators and Programmable Power Control

FEATURES

- ▶ Input voltage range: 4.5 V to 60 V
- Output voltage V_{OUT1}: 24 V
- ▶ Output voltage V_{OUT2}: 5.0 V
- ▶ Output voltage V_{OUT3}: -15 V
- Enable and disable controls
- Slew rate controls
- Access to SYNC pin for oscillator synchronization
- Access to all 7 data channels
- Access to PPC_IN pin for VOUT1 output control

EVALUATION KIT CONTENTS

ADP1034CP-1-EVALZ evaluation board

EQUIPMENT NEEDED

- DC power supplies
- ► Multimeters for voltage and current measurements
- Electronic load or resistive loads
- Function generator or alternative digital driver
- Oscilloscope
- Linduino One (DC2026C), EVAL-ADICUP3029, or Aduino Uno (not included in the evaluation kit and must be ordered separately)

SOFTWARE NEEDED

▶ ADP1034CP-1-EVALZ graphic user interface (GUI) software

DOCUMENTS NEEDED

► ADP1034 data sheet

GENERAL DESCRIPTION

The ADP1034CP-1-EVALZ is a fully featured evaluation board that demonstrates the functionality of the ADP1034 dc-to-dc flyback regulator with programmable power control (PPC), buck and inverting buck-boost regulators, and the isolated data channels.

Users can evaluate ADP1034 device measurements, such as line regulation, load regulation, and efficiency with the evaluation board. The ADP1034CP-1-EVALZ board also assists in evaluating the functionality of the PPC and isolated digital channels. Device features including oscillator synchronization, soft start, sequencing, and slew rate control can be demonstrated on the evaluation board.

Full details about the ADP1034 are available in the ADP1034 data sheet, which must be consulted when using the ADP1034CP-1-EVALZ. Refer to the ADP1034 data sheet for more details about the dc-to-dc converters and isolated data channels.

ADP1034CP-1-EVALZ EVALUATION BOARD PHOTOGRAPH



Figure 1.

Analog Devices is in the process of updating documentation to provide terminology and language that is culturally appropriate. This is a process with a wide scope and will be phased in as quickly as possible. Thank you for your patience.

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REVISION HISTORY

3/2022—Revision 0: Initial Version

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EVALUATION BOARD CONFIGURATIONS

The evaluation board is preconfigured to the output voltages described in Table 1.

 Table 1. ADP1034CP-1-EVALZ Evaluation Board Output Voltage

 Configurations

Output Voltage	Configuration ¹
V _{OUT1}	24 V (ADJ)
V _{OUT2}	5.0 V
V _{OUT3}	-15 V (ADJ)

¹ ADJ means that the output is adjusted to the specified voltage. If only the voltage is specified, without the ADJ, the output is fixed or factory programmed. The ADP1034CP-1-EVALZ board is designed so that, if desired, the user can customize the converter design to output up to 52 V between the VOUT1 and VOUT3 terminals on the board. The user is responsible for ensuring that the board is suitably configured and that appropriate safety precautions are taken.

Figure 2 outlines the evaluation board features available for the user. Figure 3 provides information about both the ADP1034 and locations for optional components, which the user can use to modify the converter design.







Figure 3. Outline of ADP1034CP-1-EVALZ Top Component Detail

EVALUATION BOARD CONFIGURATIONS

Table 2. Evaluation Board Function Descriptions

Jumper/Connector Designation	Jumper/Connector Pin Mnemonic	Description
P1	MVDD	Master side power input. The input voltage is between 2.3 V and 5.5 V.
	МСК	SPI clock input from the master controller. MCK drives SCK on the slave side.
	MI	SPI data output from the slave MI/SO line. MI is driven by SO on the slave side.
	MO	SPI data input to the slave MO/SI line. MO drives SI on the slave side.
	MSS	SPI slave select input from the master controller. This signal uses an active low logic. MSS drives SSS on the slave side.
	MGPO1	General-Purpose Output 1. MGPO1 is paired with SGPI1.
	MGPI2	General-Purpose Input 2. MGPI2 is paired with SGPO2.
	MGPO3	General-Purpose Output 3. MGPO3 is paired with SGPI3.
	MGND	Master side ground return.
P2	VINP	Power input to the ADP1034 flyback regulator. The input voltage is between 4.5 V and 60 V.
	PGNDP	Field power side ground return.
P3	VOUT1	Output from the flyback regulator.VOUT1 is set to 24 V in default configuration.
	VOUT2	Output from the buck regulator. VOUT2 is factory set to 5.0 V in default configuration.
	VOUT3	Output from the inverting regulator. VOUT3 is set to -15 V in default configuration.
	SGND2	Slave side ground return. SGND2 is connected to SGND1.
P4	SVDD	Slave side power inputs for SVDD1 and SVDD2. This input voltage is between 1.8 V and 5.5 V.
	SCK	SPI clock output from the master MCK/SCK line. SCK is paired with MCK and driven by MCK on the master side.
	SO	SPI data input to the master MI/SO line. SO is paired with MI and drives MI on the master side.
	SI	SPI data output from the master MO/SI line. Paired with MO. Driven by MO on the master side.
	SSS	SPI slave select output. Paired with MSS. SSS is driven by MSS on the master side.
	SGPI1	General-Purpose Input 1. SGPI1 is paired with MGPO1.
	SGPO2	General-Purpose Output 2. SGPO2 is paired with MGPI2.
	SGPI3	General-Purpose Input 3. SGPI3 is paired with MGPO3.
	SYNC	Frequency setting and synchronization input. Connect the SYNC pin to an external clock with a frequency between 350 kHz and 750 kHz. The switching frequency of the flyback regulator is half of the external clock frequency. If SYNC is not used, connect to SGND1.
	SGND1	Slave side ground return. SGND1 is connected to SGND2.
P5	SLEW	Flyback regulator slew rate control. The SLEW pin sets the slew rate for the SWP driver. For the fastest slew rate (best efficiency), leave the SLEW pin open. For the normal slew rate, connect the SLEW pin to VINP with Pin 1 and Pin 2 shorted. For the slowest slew rate (lowest electromagnetic interference (EMI) performance), connect the SLEW pin to GNDP with Pin 2 and Pin 3 shorted.
P6	EN	Precision enable control. The EN pin is compared to an internal precision reference to enable the flyback regulator output. Connect a jumper to Pin 2 and Pin 3 to turn on the flyback regulator. Connect a jumper to Pin 3 and Pin 4 to turn off the flyback regulator. Connect a jumper to Pin 1 and Pin 2 together with another jumper to Pin 3 and Pin 4 to use the input as a programmable undervoltage lockout (UVLO) through the R5 resistive divider and R6 resistive divider.
P8	SVDDx optional supply	Option for VOUT2 to power SVDDx. Connect a jumper to P8 to power SVDDx from VOUT2.
TP1	MGND	MGND test point.
TP2, TP11	SGND2	SGND2 test points. Connected to SGND1.
TP3	PGNDP	PGNDP test point.
TP4	SGND1	SGND1 test point. Connected to SGND2.
TP5	SWP	Flyback regulator switching node test point.
TP7	VOUT1	VOUT1 test point.
TP8	VOUT2	VOUT2 test point.
TP9	VOUT3	VOUT3 test point.
TP10	VINP	VINP test point.
TP12	PPC_IN	PPC_IN input. Adjust the VOUT1 output setting on demand through a serial command.
TP13	FB1	FB1 test point.

SETUP

To set up the ADP1034 for PPC control, the requirements are as follows:

- ► Hardware requirements: Linduino[®] One (DC2062C), Arduino Uno, or EVAL-ADICUP3029
- ▶ Software platform: Windows[®] 10

The ADP1034CP-1-EVALZ evaluation board connects to Linduino One, Arduino Uno, or EVAL-ADICUP3029 via 1-wire serial com-

Table 3. Hardware Connections

munication. Linduino One, Arduino Uno, or EVAL-ADICUP3029 connects to the PC GUI via UART communication (USB).

Hardware Setup

Connect the Arduino Uno, Linduino One, or EVAL-ADICUP3029 as described in Table 3. For example, connect the PPC_IN pin of TP12 on the ADP1034CP-1-EVALZ to the GPIO9 pin on the Arduino Uno or Linduino One board, or to IO08 on the EVAL-ADICUP3029 using a pair of wires that is as short as possible.

ADP1034CP-1-EVALZ	Arduino Uno or Linduino One	EVAL-ADICUP3029
PPC_IN (TP12)	GPIO9	IO08
SGND2 (TP2)	GND	GND



Figure 4. Linduino One and ADP1034CP-1-EVALZ Connection Setup

PC Software Setup

Package Details

The ADP1034CP-1-EVALZ GUI software package contains the files shown in Figure 5. Download the software package from www.ana-log.com/eval-adp1034.

📕 01_GUI	9/22/2021 12:24 PM	File folder	
02_Embedded	9/22/2021 12:24 PM	File folder	
03_Arduino	9/22/2021 12:24 PM	File folder	
04_Documents	10/4/2021 2:56 PM	File folder	
README.txt	9/22/2021 12:24 PM	Text Document	121
			-

Figure 5. ADP1034CP-1-EVALZ GUI Software Package Contents

HEX File Upload

Download the integrated development environment (IDE) for AVR[®] downloader uploader (AVRDUDE) from the Arduino website or the Crosscore[®] serial flash programmer.

To upload hexadecimal (HEX) files for Arduino Uno, Linduino One (DC2026C), or EVAL-ADICUP3029, refer to the Uploading HEX File section.

The available HEX files include the following, where Vx_xx_xx represents the version:

- ADP1034_ARD_Vx_xx_xx.ino.hex (Arduino Uno or Linduino One; shown as ADP1034_ARD_V2_20_54.ino.hex in Figure 10)
- ADP1034_3029_Vx_xx_x.hex (EVAL-ADICUP3029)

Package Installation

To install the ADP1034CP-1-EVALZ GUI software package to the PC, follow these steps:

- Double click the ADP1034 GUI software package executable file that is available for download from www.analog.com/evaladp1034.
- 2. Select the destination location (see Figure 6).



Figure 6. Select Destination Location Window

3. Select the Create a desktop shortcut box, and click Next (see Figure 7).

Setup - ADP1034 PPC version 2.20.52	-		\times
Select Additional Tasks			
Which additional tasks should be performed?			¢.
Select the additional tasks you would like Setup to perform while installing ADP10	34 PPC, the	n click Nex	đ.
Additional shortcuts:			
✓ Create a desktop shortcut			
< Back	Next >	Ca	ncel

- Figure 7. Select Additional Tasks Window
- 4. Click Install (see Figure 8).

eady to install	
Setup is now ready to begin installing ADP1034 PPC on your computer.	Ċ
Click Install to continue with the installation, or click Back if you want to review or chan	ige any settings.
Destination location: C:\Program Files (x86)\ADP1034 PPC	^
Additional tasks: Additional shortcuts: Create a desktop shortcut	
<	>

Figure 8. Install Window

USAGE INSTRUCTIONS

After the hardware is set up (see the Hardware Setup section), open the **ADP1034 PPC Control** GUI. The following sections describe the contents of the GUI and how to use the GUI.

Graphic User Interface

Table 4 describes the GUI options labeled in Figure 9.



Figure 9. Main Window

Label in Figure 9	GUI Option	Description	
1	Port button	Opens the Connect to Port window to connect to the port, or disconnects the port if it is already connected.	
2	Sweep button	Sweeps all PPC codes with auto CRC or stops the sweep.	
3	Input Configuration section	Allows users to input their desired VOUT1 at startup, target VOUT1, and PPC code with auto CRC.	
4	VOUT1 vs PPC Code graph	Plots the computed VOUT1 vs. PPC code based on the input configuration. The graph also includes the warning sign for 4.5 V.	
5	VOUT1 and PPC Code calculated output	Displays the targeted VOUT1 and PPC code sent by the GUI to the microcontroller.	
6	Log Box	Displays messages such as success, error, and response messages. Pause the mouse on the Log Box area to show the following buttons:	
А		The clear button clears the contents of Log Box.	
В		The verbose button shows/hides responses from the microcontroller.	
С		The export button exports the contents of Log Box in the form of a text file.	
7	Load Hex button	Loads the hex file to the microcontroller boards.	

Table 4. Main Window GUI Options

Running the Demo

Uploading HEX File

- If the port is connected, click the **Port** button (Label 1 in Figure 9) to disconnect the port, which enables the **Load Hex** button.
- Click the Load Hex button (Label 7 in Figure 9) to open the Load Hex File window (see Figure 10).



Figure 10. Load Hex File Window

- Select the desired target, port, and baud rate. The recommended baud rate is 115200.
- Select the desired downloader or uploader path by clicking the ... button for Download/Uploader Path. For ATmega328P (Arduino Uno or Linduino One), select the path for avrdude.exe. For the ADuCM3029 (EVAL-ADICUP3029), select the path for ccsfp.exe.
- Select the desired configuration file path by clicking the ... button for Config File Path. This GUI option is only available for ATmega328P (Arduino Uno or Linduino One).
- 6. Select the desired HEX file to upload by clicking the ... button for **Hex File to Load**.
- 7. Click the Load button.
- 8. A success or error message displays in Log Box (Label 6 in Figure 9). If an error occurs stating No autobaud response when loading the HEX file into the ADuCM3029, press and hold the reset and boot buttons for 5 sec, and then upload the HEX file again.
- **9.** After the HEX file loads to the ADuCM3029, press the reset button for 1 sec before connecting to the port.

Connecting to the Microcontroller

To connect the ADP1034CP-1-EVALZ board to the microcontroller, follow these steps:

 Click the Port button (Label 1 in Figure 9) to open the Connect to Port window.

P Conne	ct to Port	×	
Port :	COM5 COM5 COM3 Connect	USB Serial Port (COM5)	

Figure 11. Connect to Port Window

- 2. Click the **Port** dropdown box, and pause the mouse over the available ports to display the descriptions.
- 3. Click the desired COM port.
- 4. Click the Connect button.
- In the Log Box section (Label 6 in Figure 9), a success message shows when the GUI is connected to the COM port. Otherwise, the Log Box section shows an error message.

Sending PPC Code

To send the PPC code to the ADP1034 from the microcontroller, follow these steps:

- 1. In the Input Configuration section (Label 3 in Figure 9), configure the full-scale output voltage using VOUT1 @ Startup.
- Configure either Target VOUT1 or PPC Code. Editing Target VOUT1 computes the equivalent PPC code before sending, whereas editing PPC Code directly sends the code.
- 3. The expected **VOUT1** and **PPC Code** sent by the GUI displays in the calculated output section (Label 5 in Figure 9).
- 4. In the Log Box section (Label 6 in Figure 9), status messages show that the PPC code was written, and the response was received.

Sweeping All PPC Codes

To sweep all PPC codes, follow these steps:

- 1. Click the Sweep button (Label 2 in Figure 9).
- 2. In the Log Box section (Label 6 in Figure 9), a status message appears that the sweep was executed.
- **3.** To stop the sweep while running, click the **Sweep** button (Label 2 in Figure 9) again.

REGULATOR OUTPUT MEASUREMENT

Figure 12 shows the recommended measurement setup to evaluate the ADP1034CP-1-EVALZ flyback regulator.

Figure 13 shows the recommended setup to evaluate the ADP1034CP-1-EVALZ buck regulator.

Figure 14 shows the recommended setup to evaluate the ADP1034CP-1-EVALZ inverting regulator.

 V_{SUPPLY} is the power supplied to the ADP1034CP-1-EVALZ. V_{VINP} is the input supply voltage. I_{IN} is the input supply current.





Figure 13. Buck Regulator Measurement Setup

005



Figure 14. Inverting Regulator Measurement Setup

POWER DOMAIN EFFICIENCY MEASUREMENT

Measure the actual input voltage and output voltage from the evaluation board for overall efficiency measurements. Figure 15 shows the recommended setup for the overall efficiency measurement for the ADP1034CP-1-EVALZ.

The overall efficiency is calculated using the following equation:

$\eta_{OVERALL} =$



where:

 $\eta_{OVERALL}$ is the overall efficiency of the ADP1034.

 V_{OUT1} is the output voltage of the flyback regulator.

 I_{OUT1} is the output current on the flyback regulator.

 V_{OUT2} is the output voltage of the buck regulator.

 I_{OUT2} is the output current on the buck regulator. V_{OUT3} is the output voltage of the inverting regulator.

 I_{OUT3} is the output current on the inverting regulator.

Figure 15. Overall Efficiency Measurement Setup

200

DATA INPUT/OUTPUT (I/O) MEASUREMENT

Each data channel and its associated power supply input are accessed through the P1 header connector and P4 header connector. Each side of the ADP1034CP-1-EVALZ isolator requires an off board power source. The power sources must be independent from each other to apply common-mode voltages across the isolation barrier. Sharing a single power supply for MVDD and SVDDx does not harm the isolator. Sharing a power supply is also useful for testing the ADP1034 digital isolators when common-mode voltages are not present.

A 100 $k\Omega$ pull-down resistor to ground is installed on each digital input.

To properly operate the SPI channels and GPIO channels, refer to the ADP1034 data sheet.

HIGH VOLTAGE CAPABILITY

Take appropriate care when using the evaluation board at high voltages. Do not rely on the printed circuit board (PCB) for safety functions because the PCB has not been high potential tested (also known as hipot tested or dielectric withstanding voltage tested) nor certified for safety.

OUTPUT VOLTAGE MEASUREMENTS

For accurate output voltage measurements from the evaluation board, connect the evaluation board to a voltage source and a voltmeter. Use a resistor or an electronic load as the load for the regulators.

Ensure that the resistor has an adequate power rating to handle the expected power dissipation. Taking into account the device efficiency, ensure that the power supply has enough current for the expected load levels.

Use the following steps to connect the power supply and voltmeter to the evaluation board (refer to Figure 12 through Figure 15 for the setup diagrams):

- 1. Connect the negative terminal (-) of the power supply and voltmeter to the PGNDP power terminal of Connector P2 on the left side of the evaluation board.
- 2. Connect the positive terminal (+) of the power supply to the VINP terminal of Connector P2 on the left hand side of the evaluation board.
- Connect the HI terminal of the voltmeter to VINP at TP10, and connect the LO terminal to PGNDP at TP3 to monitor the actual input voltage supplied to the ADP1034.
- Connect a load between the VOUT1, VOUT2, or VOUT3 pin and the SGND2 pin at the output connector (P3) on the right side of the evaluation board.
- Connect the voltmeters to the output test points (TP7 for VOUT1, TP8 for VOUT2, and TP9 for VOUT3) in reference to SGND2 or SGND1.

Turn on the voltage source for VINP by pressing the power button. The regulators power up if Pin 2 and Pin 3 of the EN jumper (P6) are connected.

If long power leads are used from the power supply, especially with higher loads, users are recommended to use a large capacitor (100 μ F or more) connected across the VINP terminals and PGNDP to prevent losses from lead inductance. Likewise, adjust the input voltage to ensure that the supply voltage is within the user specified target range. A power supply with a 4-wire supply and sense arrangement can be used as an alternative to manually adjusting the supply voltage to be within the user specified range.

LINE REGULATION

For line regulation measurements, the voltmeter measures the regulator output while the input supply is varied. The line regulation measurement can be repeated under different load conditions. During line regulation tests, the leads to the power supply must be short, and any additional input capacitor must be removed. Figure 16 shows the typical line regulation performance of the ADP1034 flyback regulator output.



Figure 16. Flyback Regulator Line Regulation, V_{OUT1} = 24 V, I_{OUT1} = 25 mA, T_A = 25°C, Nominal = V_{OUT1} with V_{VINP} = 24 V

LOAD REGULATION

For load regulation measurements, monitor the regulator output while the load is varied. The input voltage must be held constant during the load regulation measurement. Figure 17, Figure 18, and Figure 19 show the typical ADP1034 load regulation performance of the flyback regulator, buck regulator, and inverting regulator, respectively. Keep power leads short during this test, and ensure that the supply voltage is constant under all load conditions.



Figure 17. Flyback Regulator Load Regulation, V_{OUT1} = 24 V, T_A = 25°C, Nominal = V_{OUT1} at 25 mA Load



Figure 18. Buck Regulator Load Regulation, V_{OUT1} = 24 V, V_{OUT2} = 5 V, T_A = 25°C, Nominal = V_{OUT2} at 10 mA Load

OUTPUT VOLTAGE MEASUREMENTS



Figure 19. Inverting Regulator Load Regulation, $V_{OUT1} = 24$ V, $V_{OUT3} = -15$ V, $T_A = 25^{\circ}$ C, Nominal = V_{OUT3} at -5 mA Load

EFFICIENCY

For efficiency measurements, monitor the regulator input supply and output voltages while the load is varied. Keep power leads short during the efficiency measurement test, and use a power supply with remote sense. Connect ammeters in series with the input supply and the loads. Connect voltmeters to the test points provided for the input and the outputs of the regulators. For the most accurate results, measure the voltage across the input and output capacitors. If possible, particularly at a low current, trigger the meters simultaneously and set the meters to perform average readings for a period of a few hundred milliseconds. Figure 20 shows the typical overall efficiency curve for the ADP1034 with a varying output load on the flyback regulator and a constant load on the buck and inverting regulators.



Figure 20. ADP1034 Overall Efficiency, $V_{VINP} = 24$ V, $V_{OUT1} = 24$ V, $V_{OUT2} = 5$ V, $I_{OUT2} = 6$ mA, $V_{OUT3} = -15$ V, $I_{OUT3} = -4$ mA, $T_A = 25^{\circ}C$

EVALUATION BOARD SCHEMATICS AND ARTWORK



Figure 21. ADP1034CP-1-EVALZ Evaluation Board Schematic

EVALUATION BOARD SCHEMATICS AND ARTWORK





Figure 22. ADP1034CP-1-EVALZ Evaluation Board Schematic—Connectors and Peripherals



Figure 23. ADP1034CP-1-EVALZ Evaluation Board Top Layer



Figure 24. ADP1034CP-1-EVALZ Evaluation Board Bottom Layer



Figure 25. ADP1034CP-1-EVALZ Evaluation Board Layer 2—GND1



Figure 26. ADP1034CP-1-EVALZ Evaluation Board Layer 3—GND2

EVALUATION BOARD SCHEMATICS AND ARTWORK



Figure 27. ADP1034CP-1-EVALZ Evaluation Board Silkscreen (Top)

ORDERING INFORMATION

BILL OF MATERIALS

Table 5. Bill of Materials

Quantity	Reference Designator	Description	Manufacturer/Part Number
3	C1, C3, C7	Capacitors, multilayer ceramic capacitor (MLCC), 0.1 $\mu\text{F},$ 16 V, 0402, X7R	Determined by the user
1	C2	Capacitor, MLCC, 4.7 µF, 100 V, 1206, X7S	Murata/GRM31CC72A475KE11L
1	C4	Capacitor, MLCC, 10 µF, 50 V, 1206, X7R	Samsung/CL31B106KBHNNNE
1	C5	Capacitor, MLCC, 10 µF, 16 V, 0805, X7R	Samsung/CL21B106KOQNNNE
1	C6	Capacitor, MLCC, 4.7 µF, 50 V, 0805, X7R	Murata/GRM21BZ71H475KE15L
1	D1	Diode, ultrafast rectifier, 1 A, 200 V, surface-mount device (SMD)	Diodes Incorporated/US1DWF-7
1	D2	Diode, Zener voltage regulator, 47 V, 0.5 W, SMD	ON Semiconductor/MMSZ5261BT1G
1	D3	Diode, Schottky rectifier, 1 A, 200 V, SMD	Diodes Incorporated/DFLS1200Q-7
2	L1, L2	Inductors, shielded, 100 µH, 0.39 A	Coilcraft/XFL3012-104MEB
2	P1, P4	Headers, 12-pin	Samtec/TSW-106-07-G-D
1	P2	Terminal block, 2-pin	TE Connectivity/282834-2
1	P3	Terminal block, 4-pin	TE Connectivity/282834-4
1	P5	Header, 3-pin	Samtec/TSW-103-07-F-S
1	P6	Header, 4-pin	Samtec/TSW-104-07-G-S
1	P8	Header, 2-pin	Samtec/TSW-101-07-G-D
7	R1, R2, R3, R4, R11, R12, R13	Resistors, 100 kΩ, 1/10 W, 1%, 0603, SMD	Determined by the user
2	R5, R7	Resistors, 3.4 MΩ, 1/10 W, 1%, 0603, SMD	Determined by the user
1	R6	Resistor, 232 kΩ, 1/10 W, 1%, 0603, SMD	Determined by the user
1	R8	Resistor, 191 kΩ, 1/10 W, 1%, 0603, SMD	Determined by the user
1	R9	Resistor, 118 kΩ, 1/10 W, 1%, 0603, SMD	Determined by the user
1	R10	Resistor, 3.48 MΩ, 1/10 W, 1%, 0603, SMD	Determined by the user
11	TP1, TP2, TP3, TP4, TP5, TP7, TP8, TP9, TP10, TP11, TP12	Headers, 1-pin	Samtec/TSW-101-07-G-S
1	T2	Transformer, 1:1 turn ratio, 470 µH	Coilcraft/ZA9644-AED
1	U1	3-channel isolated micropower management unit with seven digital isolators and PPC	Analog Devices/ADP1034ACPZ-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 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 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 NONINFRINGEMENT 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.



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