

EZ-KIT ADZS-UCM3029EZLITE for the ADuCM3027/ADuCM3029 Microcontroller

INTRODUCTION

This getting started guide describes the [ADuCM3027/ADuCM3029 EZ-KIT](#) package that is used to evaluate the [ADuCM3027/ADuCM3029](#) microcontroller units. This guide describes the different parts and components of the [EZ-KIT](#) evaluation board, the functionalities, and the configurations that enable the user to develop applications with the device.

DOCUMENTS NEEDED

[ADuCM3029 EZ-KIT® Manual](#)

GENERAL DESCRIPTION

The [ADuCM3027/ADuCM3029](#) are ultralow power, integrated, mixed signal microcontroller units (MCUs) used for processing, control, and connectivity. The MCU system is based on an ARM® Cortex-M3 processor, which is a 32-bit RISC processor and runs up to 26 MHz. It can have up to 256 kB of embedded flash memory with error correcting code (ECC) and up to 64 kB of system random-access memory (RAM) with parity.

The [ADuCM3027/ADuCM3029](#) also feature a collection of digital peripherals, and an analog subsystem that provides clocking, reset, and power management capabilities in addition to an analog-to-digital converter (ADC) subsystem.

Refer to the [ADuCM3027/ADuCM3029](#) product pages for future updates.

EVALUATION BOARD PHOTOGRAPH

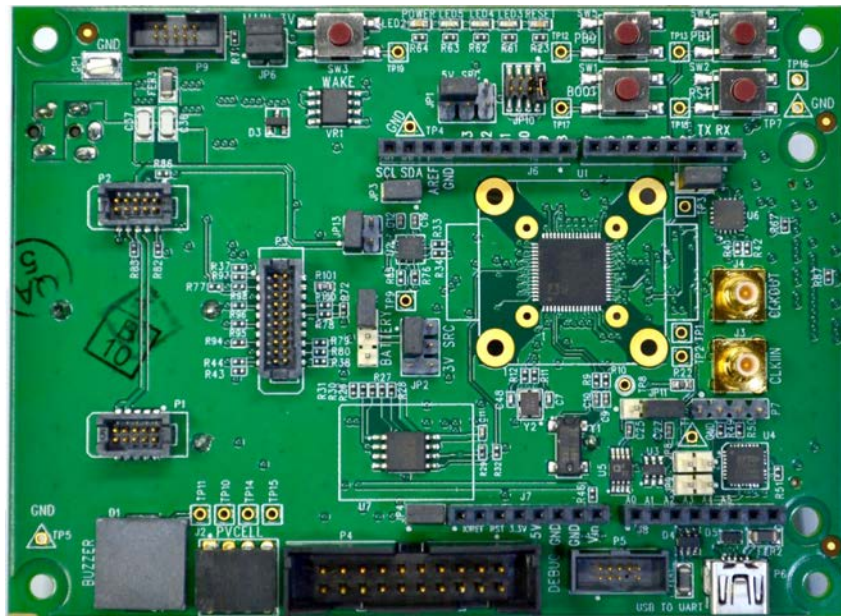


Figure 1. ADuCM3027/ADuCM3029 Evaluation Board

TABLE OF CONTENTS

Introduction	1	On-Board Tri Sensor Circuit (Accelerometer, Temperature, and ADC)	5
Documents Needed	1	On-Board Digital I ² C Temperature Sensor	5
General Description	1	On-Board 32 Mb Serial Flash Memory	6
Evaluation Board Photograph	1	On-Board Buzzer	6
Revision History	2	EZ-Kit Board Connectors	7
Overview	3	Arduino UNO Connectors (J6, J7, J8, and J9)	8
Contents	3	Expansion Interface 3 (EI3)	9
J-Link LITE Emulator	3	Wireless Transceivers Interface (P1, P2, and P3)	9
Board Features	3	Emulation and Serial Interface Connector (P4, P5, and P9)	9
Power Supply	3	EZ-KIT Board System Architecture	10
Power Indicator/General-Purpose LEDs	4	EZ-KIT Board Schematics	11
Crystal Circuits	4	Ordering Information	22
Emulator Interface	4	Bill of Materials	22
Reset/Wake/Boot/General-Purpose Push Buttons	4	Notes	24
USB to UART Interface	5		

REVISION HISTORY

8/2017—Rev. 0 to Rev. A

Changes to Contents Section, Figure 2, Figure 3, and Power Supply Section	3
Changed PV Cell JP2 Pins, Table 2	4
Changes to Table 3 and Table 4	4
Changes to On-Board Tri Sensor Circuit (Accelerometer, Temperature, and ADC) Section and On-Board Digital I ² C Temperature Sensor Section	5
Changes to Figure 9 Caption	6
Added Endnote 1, Table 7	8
Changes to Figure 19	10
Changes to Figure 20	11
Changes to Figure 23	13
Changes to Figure 28	15
Changes to Figure 29	16
Changes to Figure 31	17
Changes to Figure 32 and Figure 33	18
Changes to Figure 34	19
Changes to Table 9	22

4/2017—Revision 0: Initial Version

OVERVIEW

The ADuCM3027/ADuCM3029 evaluation board found in the EZ-KIT allows a user to program, debug, and evaluate the performance of the ADuCM3027/ADuCM3029 MCUs.

CONTENTS

The EZ-KIT package contains the following items (see Figure 2):

- ADuCM3027/ADuCM3029 EZ-KIT board
- USB 2.0 cable
- J-Link LITE emulator



Figure 2. EZ-KIT Package Contents

J-Link LITE Emulator

The J-Link LITE emulator board provides a debug path interface via serial wire, power supply, and universal asynchronous receiver/transmitter (UART) communication with the ADuCM3027/ADuCM3029 EZ-KIT board. Figure 3 shows a top view of the emulator board.



Figure 3. J-Link LITE Emulator

The serial wire debug connector is a 20-pin device, but only three connections are made: SWDIO and SWCLK are used for debug purposes and the RESET connection provides a reset from the PC, if required. Table 1 shows the JTAG connector pin configuration.

Table 1. JTAG Connector Pin Configuration

Pin	Signal
1	VDD
4, 6, 8, 10, 12, 14, 16, 18, 20	GND
7	SWDIO
9	SWCLK
15	RESET

When measuring current consumption using an external supply on the ADuCM3027/ADuCM3029 EZ-KIT board, it is recommended to disconnect the emulator.

BOARD FEATURES

Power Supply

The EZ-KIT evaluation board can be powered by numerous sources to evaluate the capability of the ADuCM3027/ADuCM3029 MCUs.

The following sources are the options for powering the evaluation board:

1. External power supply. The EZ-KIT evaluation board package can be powered by a 5 V dc regulated power adaptor (not included in the evaluation kit). To use the adaptor to supply the MCU, Pin 3 and Pin 5 of JP1 and Pin 1 and Pin 3 of JP2 must be shorted; then, connect the adaptor to the P8 power jack.
2. J-Link LITE emulator. The J-Link LITE emulator can power the evaluation board while debugging and programming the MCU. To use this option, short Pin 1 and Pin 3 of JP1 and Pin 1 and Pin 3 of JP2. To power the board by this option, command the J-Link to power the board, run the J-Link commander, and then execute the **power on perm** command.
3. USB power supply. The EZ-KIT board can draw power from the USB to the UART port on the lower right side of the board. To configure for this setup, short Pin 3 and Pin 4 of JP1 and Pin 1 and Pin 3 of JP2.
4. Coin cell battery. The EZ-KIT board can be powered by a 3 V coin cell battery (included in the kit). To use the coin cell battery, short Pin 1 and Pin 2 of JP12 and Pin 3 and Pin 4 of JP2.
5. AA battery. To use an AA battery, short Pin 2 and Pin 3 of JP12 and Pin 3 and Pin 4 of JP2.
6. PV Cell. The EZ-KIT board can be also be powered by Analog Devices, Inc., energy harvesting kits. To use this as an option, short Pin 3 and Pin 5 of JP2.

The configuration for the power options are listed in Table 2. The numbers indicate the pins to be shorted.

Table 2. Power Option Configurations of EZ-KIT Board

Sources	JP1 ¹	JP2	JP12 ¹
External Power Adapter	3, 5	1, 3	X
Emulator/J-Link LITE	1, 3	1, 3	X
USB Power	3, 4	1, 3	X
Coin Cell Battery	X	3, 4	1, 2
AA Battery	X	3, 4	2, 3
PV Cell	X	3, 5	X

¹ X means don't care.

The 5 V sources (external power, emulator, and USB) are connected to the on-board 3.3 V low dropout (LDO) regulator before they power the components and the MCU on the board.

The battery and the PV cell supplies are directly connected to the EZ-KIT internal components (MCU, flash, temperature sensor, and accelerometer). Do not supply more than 3.6 V on the battery and PV cell terminals to avoid damaging the MCU.

Power Indicator/General-Purpose LEDs

The EZ-KIT board has five light emitting diodes (LEDs) to indicate different board statuses. LED1 (red) indicates if the board has been reset. LED2 (green) indicates that the board is powered up.

General-purpose yellow LEDs (LED3, LED4, and LED5) are programmable and connected to the pins of the MCU. These are all active low LEDs; this means that writing low to the pins where the LED is connected lights up the LEDs.

The LED to MCU pin connections are described in Table 3.

Table 3. LED to MCU Pin Connections

LED	Mnemonic
LED1	SYS_HWRST
LED2	Not applicable (LED2 is directly connected to the power line)
LED3	P0_13, GPIO13, XINT0_WAKE2
LED4	P1_12, GPIO28
LED5	P0_13, GPIO29

Crystal Circuits

The EZ-KIT board uses two crystals to clock the system: a 26 MHz and a 32.768 kHz crystal. The 26 MHz crystal is a possible clock source for the full system such as the core, SRAM, bus, flash, and others. The 32.768 kHz crystal is a possible clock source of the LF MUX, connected to the low speed peripherals, such as the beeper controller or timers.

Emulator Interface

Application, download, and emulation are possible on the ADuCM3027/ADuCM3029 via serial wire by using the J-Link LITE emulator through the P4 connector on the EZ-KIT board.

Reset/Wake/Boot/General-Purpose Push Buttons

The EZ-KIT board has five push buttons (see Figure 4) with different operations assigned to them.

- The boot mode select switch (SW1) determines the boot mode of the processor. By default, the processor boots from the internal flash memory. When pressed, the UART download mode is triggered. See the ADuCM3029 EZ-KIT® Manual, Revision 1.0 for further information. (This is the manual included in the downloadable board support package for the ADuCM3027/ADuCM3029).
- The reset switch (SW2) resets the ADuCM3027/ADuCM3029 processor.
- The wake switch (SW3) is connected to the processor wake signals, and it is used to wake up the processor during low power modes. Depending on the configuration of JP10, the different external interrupts wake up the MCU.
- Table 4 shows which pins must be shorted on JP10 to choose which external interrupt is connected to the WAKE switch.

Table 4. External Interrupt Choice for the WAKE Switch

Pins	Signal
1, 2	XINT0_WAKE0
3, 4	XINT0_WAKE1
5, 6	XINT0_WAKE3
7, 8	XINT0_WAKE4

- The PB0 switch (SW5) is a general-purpose switch connected to (GPIO) P1.14.
- The PB1 switch (SW4) is a general-purpose switch connected to (GPIO) P2.6.



Figure 4. EZ-KIT Push Buttons Located Near the LEDs

USB to UART Interface

The EZ-KIT has an on-board USB to UART interface circuit used to connect the ADuCM3027/ADuCM3029 MCUs to a PC. The USB to UART functionality is provided by an FT232R (U4) chip. The chip handles the entire USB protocol on-chip, and no USB firmware development is required. The FT232R can transfer data at rates from 300 Baud to 3 Mbaud at transistor to transistor (TTL) levels.

The ADuCM3027/ADuCM3029 MCUs UART0 pins are connected directly to the interface pins of the FT232R chip (U4). If another USB to UART module is used, the UART0 signals can be tapped on the P7 4 × 1 header.

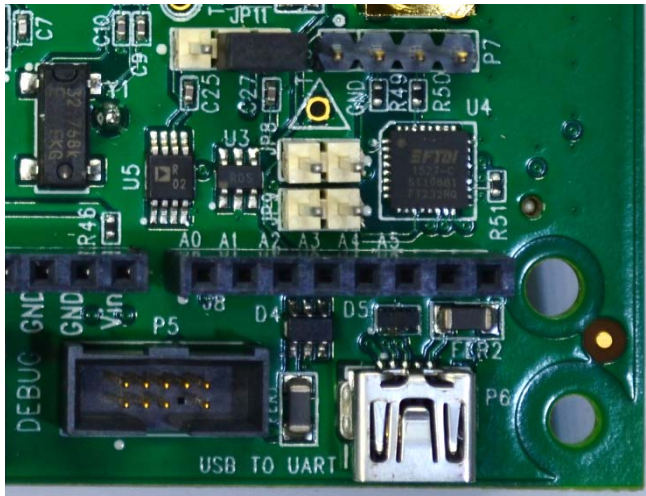


Figure 5. USB to UART Circuit

On-Board Tri Sensor Circuit (Accelerometer, Temperature, and ADC)

The EZ-KIT board has an on-board tri sensor circuit consisting of a 3-axis microelectromechanical systems (MEMS) accelerometer, a temperature sensor, and an analog-to-digital converter (ADC); which is provided by the ADXL363 (U2). This circuit is shown in Figure 6.

The entire system consumes less than 2 μ A at a 100 Hz output data rate and 270 nA that, when in motion, triggers the wake-up mode. The ADXL363 communicates with the ADuCM3027/ADuCM3029 MCUs via the serial port interface (SPI2). The accelerometer provides selectable measurements of ± 2 g, ± 4 g, and ± 8 g with a resolution of 1 mg/LSB on the ± 2 g range. The temperature sensor operates with a scale factor of 0.065°C. The ADC has no external connections, but it can be used by tapping to R85 trace.

This circuit can be powered down by unshorting the JP3 header.

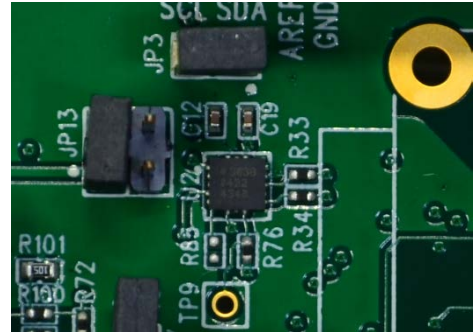


Figure 6. Tri Sensor Circuit

On-Board Digital I²C Temperature Sensor

The EZ-KIT board has an on-board I²C digital temperature sensor, ADT7420. The ADT7420 (U6) is rated for operation over the -40°C to $+150^{\circ}\text{C}$ temperature range.

The ADT7420 operates from 2.7 V to 5.5 V. Operating at 3.3 V, the average supply current is typically 210 μ A and the shutdown current is typically 2.0 μ A.

The ADT7420 has two available pins for address selection with four possible I²C addresses. The user can configure the address by soldering resistors either in R39 and R40 (to GND), or in R41 and R42 (to VBAT). The default address is 0x48.

The ADT7420 is connected to the I²C0 interface and can generate an interrupt signal to interrupt the MCU. The interrupt signal pin of the ADT7420 is connected to Pin P1_14 of the ADuCM3027/ADuCM3029.

The temperature sensor can be disconnected from the board supply by unshorting the JP5 header. Figure 7 shows the circuit with the ADT7420 chip in the middle and the JP5 header above the chip.



Figure 7. I²C Temperature Circuit

On-Board 32 Mb Serial Flash Memory

The EZ-KIT board has an on-board serial flash memory that can store voice, text, and data.

The serial flash memory (U7) is a W25Q32 chip that has a storage size of 32 Mb. The chip supports a standard serial peripheral interface (SPI) with speeds up to 104 MHz. The chip is interfaced with the SPI2 of the MCU and can be disconnected from the board by unshorting the JP4 header.

Figure 8 shows the circuit with the W25Q32 chip in the middle and the JP4 header below the flash chip.

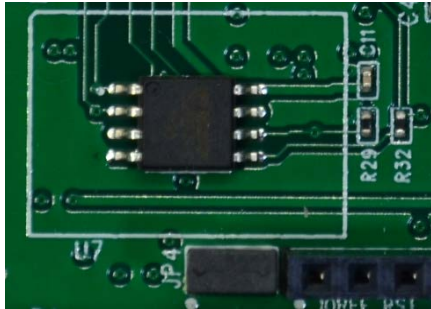


Figure 8. External 32 Mb Serial Flash Memory

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On-Board Buzzer

The EZ-KIT has a buzzer (D1) that can generate tones and alarms with the beeper controller inside the ADuCM3027/ADuCM3029 MCU. Figure 9 shows the buzzer chip beside the PV cell connector.

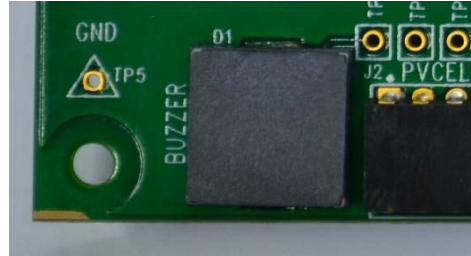


Figure 9. Buzzer Chip

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EZ-KIT BOARD CONNECTORS

The EZ-KIT board has a number of connectors used to connect different boards and kits for evaluation. The connector locations are shown in Figure 10.

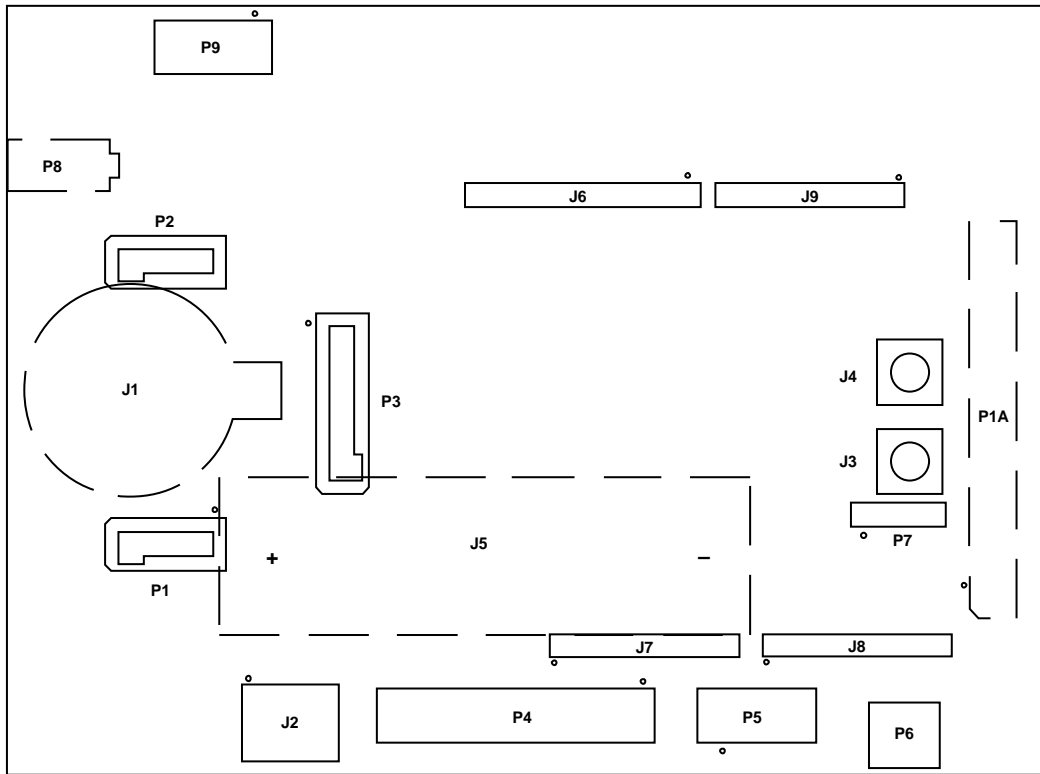


Figure 10. Connector Locations

ARDUINO UNO CONNECTORS (J6, J7, J8, AND J9)

The EZ-KIT board has an Arduino Uno compatible form factor interface that can accept Arduino shields and daughter boards. The pinout of the Arduino interface is described in Table 5 through Table 8.

Table 5. Arduino Interface J6 Connector Pinout

J6 Pin No.	Arduino Pin	ADuCM3027/ADuCM3029 Pin
1	8	P1_02/GPIO18/SPI2_CLK
2	9	P1_15/GPIO31
3	10	P0_03/GPIO03/SPIO_CS0
4	11	P0_01/GPIO01/SPIO_MOSI
5	12	P0_02/GPIO02/SPIO_MISO
6	13	P0_00/GPIO00/SPIO_CLK
7	GND	GND
8	AREF	VREF_ADC
9	SDA	P0_05/I2C0_SDA
10	SCL	P0_04/I2C0_SCL

Table 6. Arduino Interface J7 Connector Pinout

J7 Pin No.	Arduino Pin	ADuCM3027/ADuCM3029 Pin
1	No connect	Not applicable
2	IOREF	Not applicable
3	RST	SYS_HWRST
4	3.3V	Not applicable
5	5V	Not applicable
6	GND	Not applicable
7	GND	Not applicable
8	Vin	Not applicable

Table 7. Arduino Interface J8 Connector Pinout

J8 Pin No.	Arduino Pin	ADuCM3027/ADuCM3029 Pin
1	A0	ADC0
2	A1	ADC1
3	A2	ADC2
4	A3	ADC3
5	A4	ADC4
6	A5	ADC5
7	N/A ¹	P1_03/GPIO19/SPI2_MOSI
8	N/A ¹	P1_04/GPIO20/SPI2_MISO

¹ N/A means not applicable.

Table 8. Arduino Interface J9 Connector Pinout

J9 Pin No.	Arduino Pin	ADuCM3027/ADuCM3029 Pin
1	0	P0_11/UART0_RX
2	1	P0_10/UART0_TX
3	2	P0_15/GPIO15
4	3	P2_11/GPIO43/SPI1_CS1
5	4	P2_01/GPIO33
6	5	P2_02/GPIO34/SPI1_CS2
7	6	P2_00/GPIO32
8	7	P0_12/GPIO12

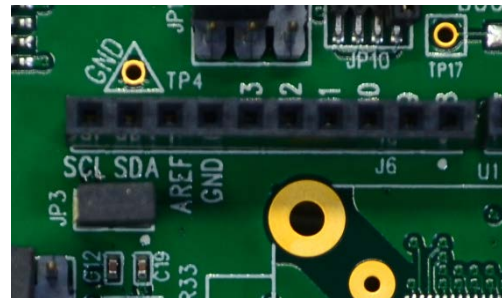


Figure 11. J6 Arduino Header (GPIO Pins, SPI, and I²C)

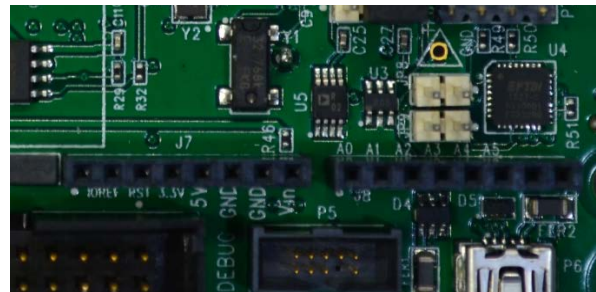


Figure 12. J7 and J8 Arduino Compatible Interface (Power and ADC)

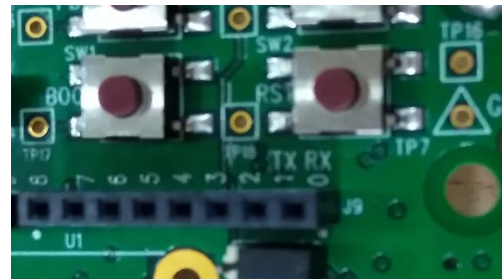


Figure 13. J9 Arduino Compatible Interface (GPIO)

EXPANSION INTERFACE 3 (EI3)

The EZ-KIT board includes one expansion interface connector located on the bottom side of the board. EI3 supports connection to other EI3 daughter boards designed by Analog Devices, extending the evaluation board capabilities. The connectors provide power, ground, reset, ADC, I²C, SPI, UART, SPORT, and GPIO signals.

An EI3 SDP breakout board (which is sold separately), as shown in Figure 15, is required to tap and probe the signals in this connector.



Figure 14. EI3 Connector

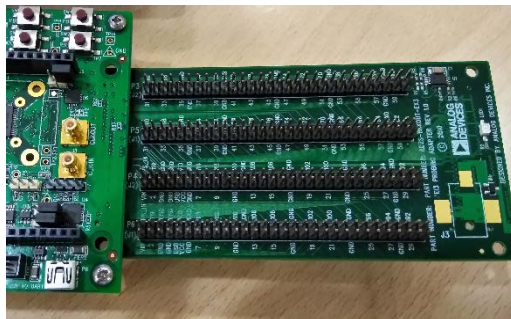


Figure 15. EI3 SDP Breakout Board Connected to EZ-KIT Board

WIRELESS TRANCEIVERS INTERFACE (P1, P2, AND P3)

The wireless transceiver daughterboard interface supports the ADF7023, ADF7024, ADF7242, ADF7030, and ADF7030-1 wireless transceivers. These are low power, high performance, integrated radio transceivers supporting a wide range of modulation schemes and channel widths in the sub GHz and 2.4 GHz frequency ranges.

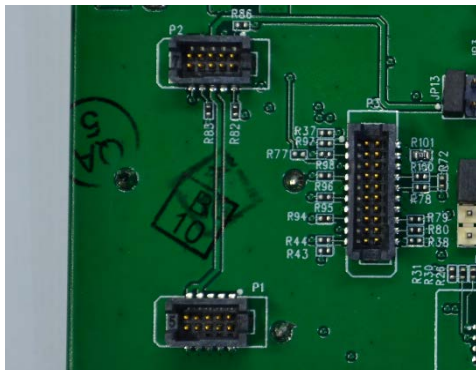


Figure 16. Wireless Transceiver Interface

EMULATION AND SERIAL INTERFACE CONNECTOR (P4, P5, AND P9)

The P4, P5, and P9 connectors provide a connection from the EZ-KIT board to the emulator board. P4 is a 20-pin standard JTAG connector compatible with the J-Link LITE emulator.

P5 and P9 are 10-pin debug/emulator connectors with serial wire, power source, and UART signal lines for debugging purposes.



Figure 17. P9 Debug Connector

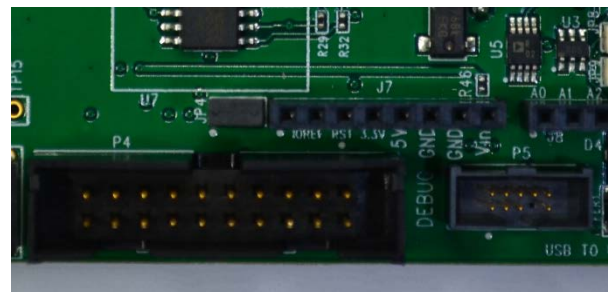


Figure 18. P4 and P5 Debug Connectors

EZ-KIT BOARD SYSTEM ARCHITECTURE

Figure 19 shows a block diagram of the EZ-KIT Board.

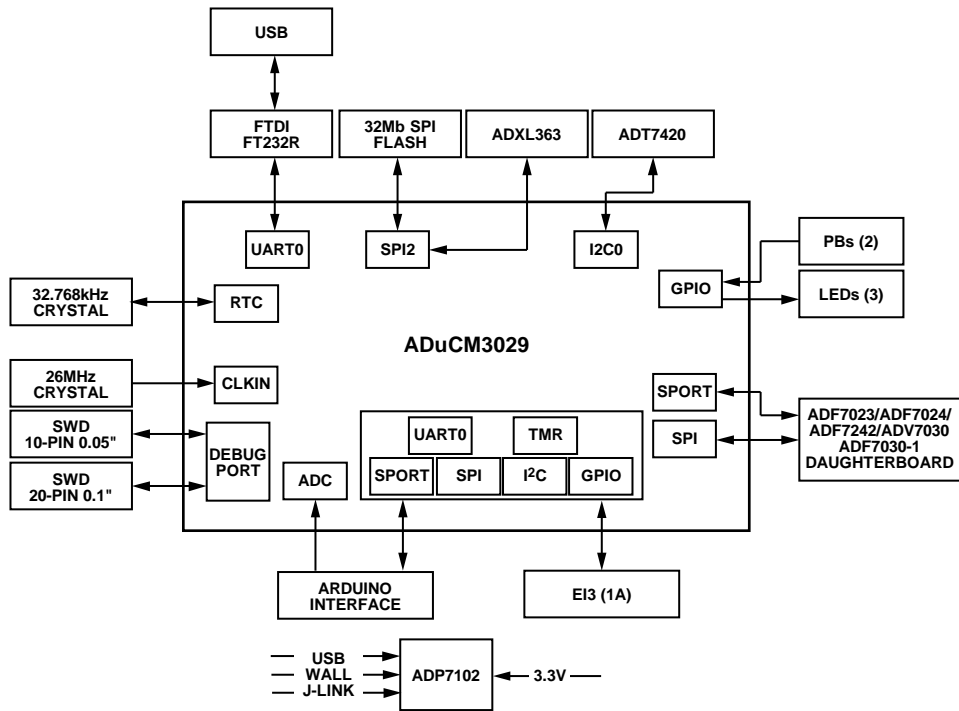


Figure 19. EZ-KIT Board Block Diagram

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EZ-KIT BOARD SCHEMATICS

Figure 20 through Figure 37 show the schematics of the EZ-KIT board.

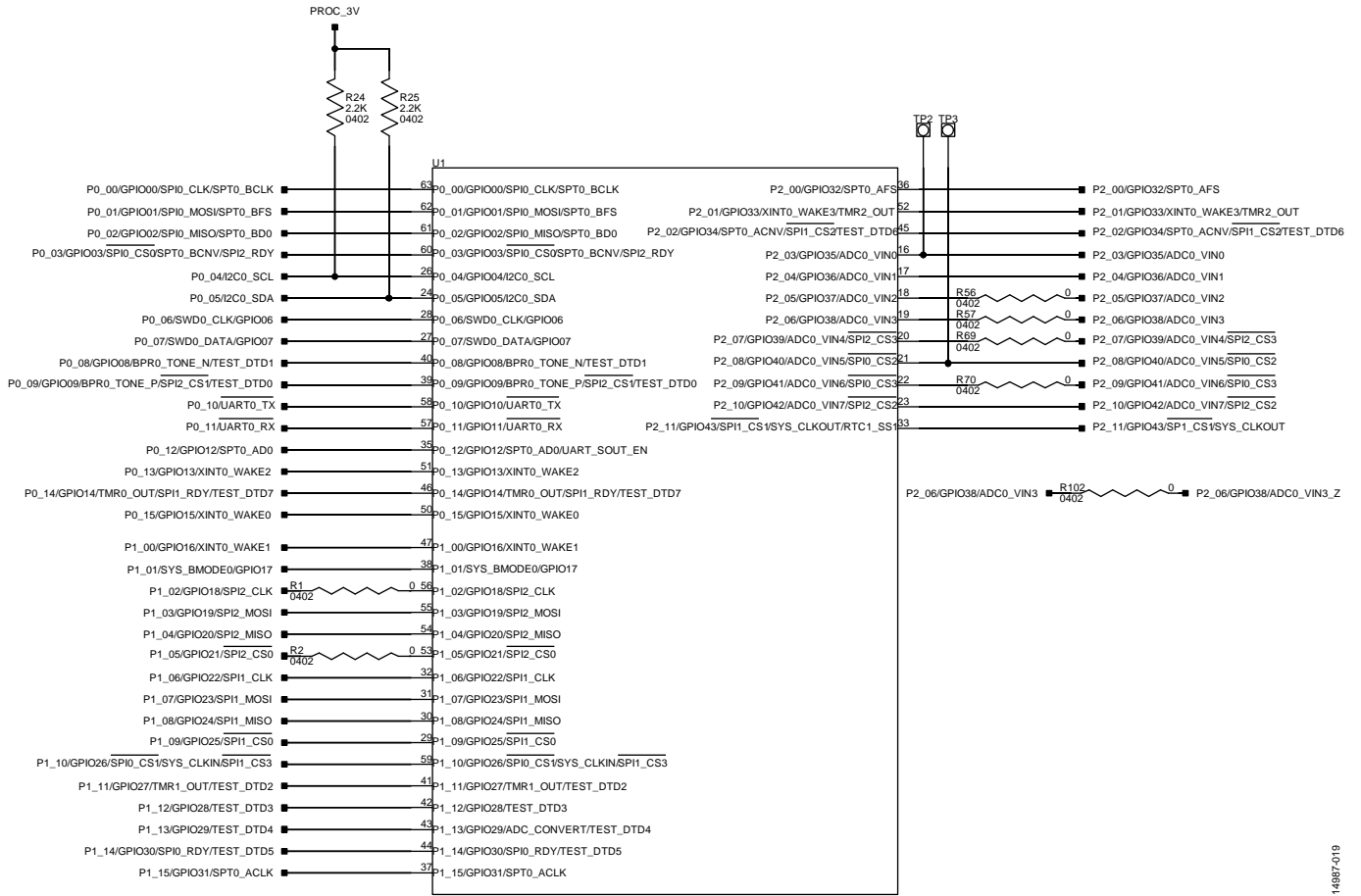


Figure 20. ADuCM3027/ADuCM3029 MCU GPIO Schematic

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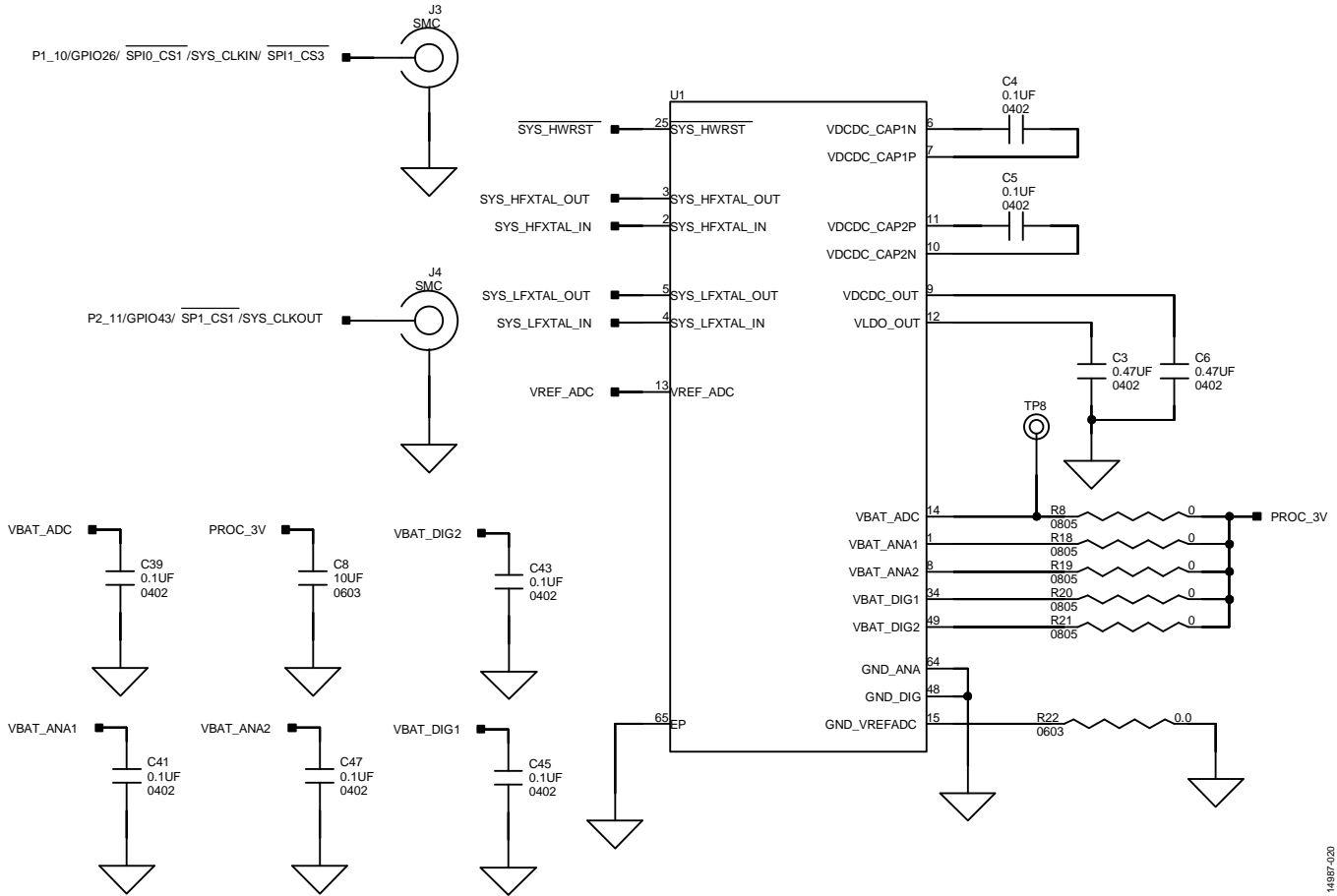


Figure 21. ADuCM3027/ADuCM3029 MCU Power and Reset Schematics

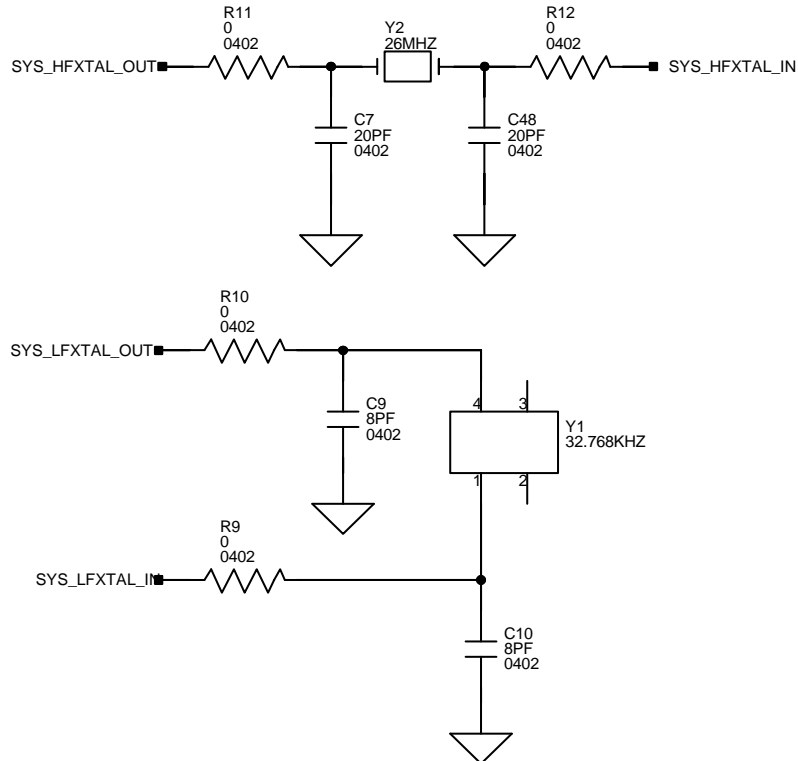


Figure 22. Crystal Circuit Figure

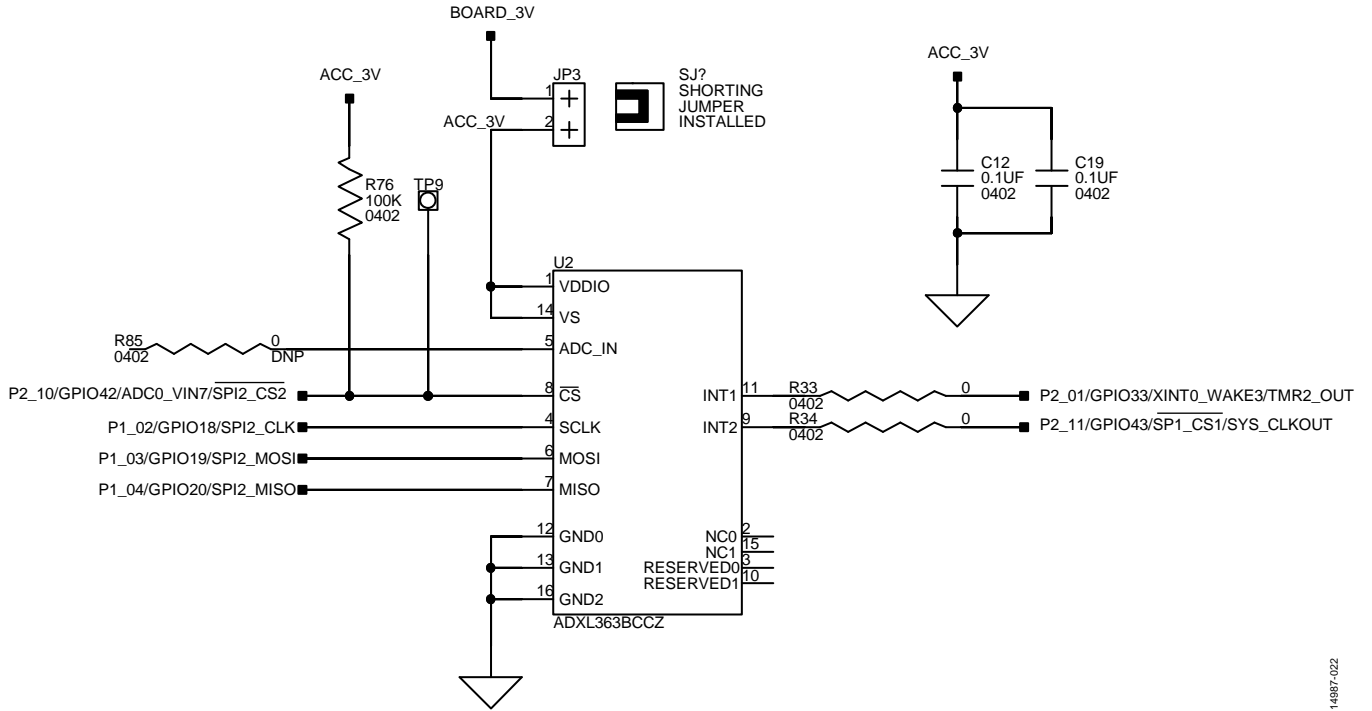


Figure 23. Tri Sensor Circuit

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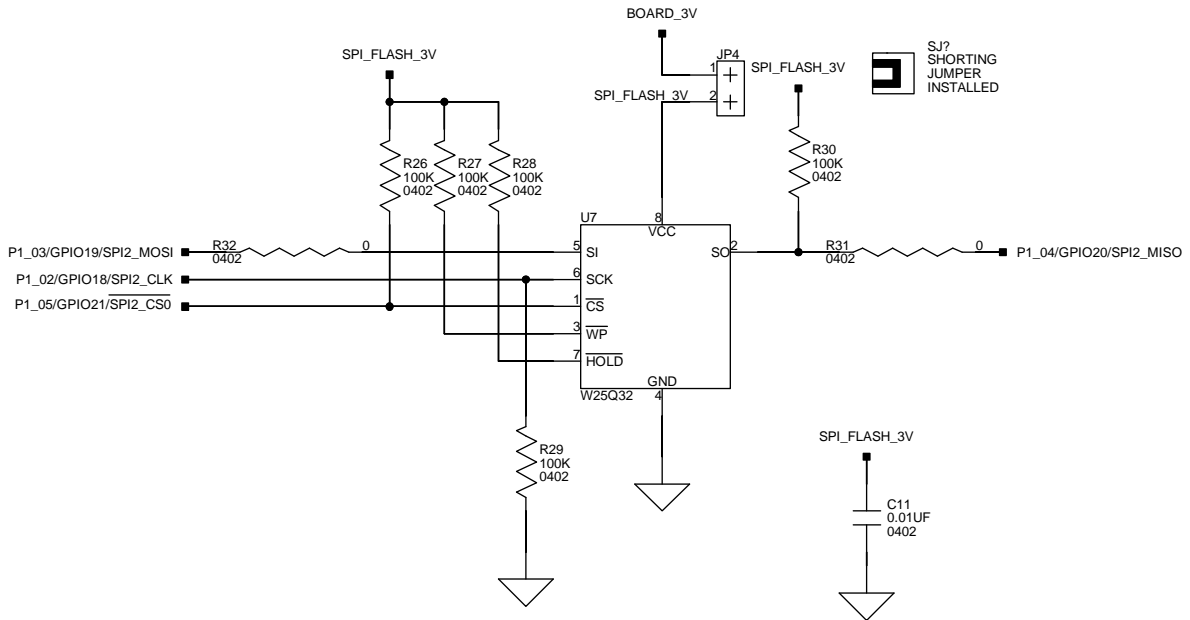


Figure 24. External Flash Circuit Diagram

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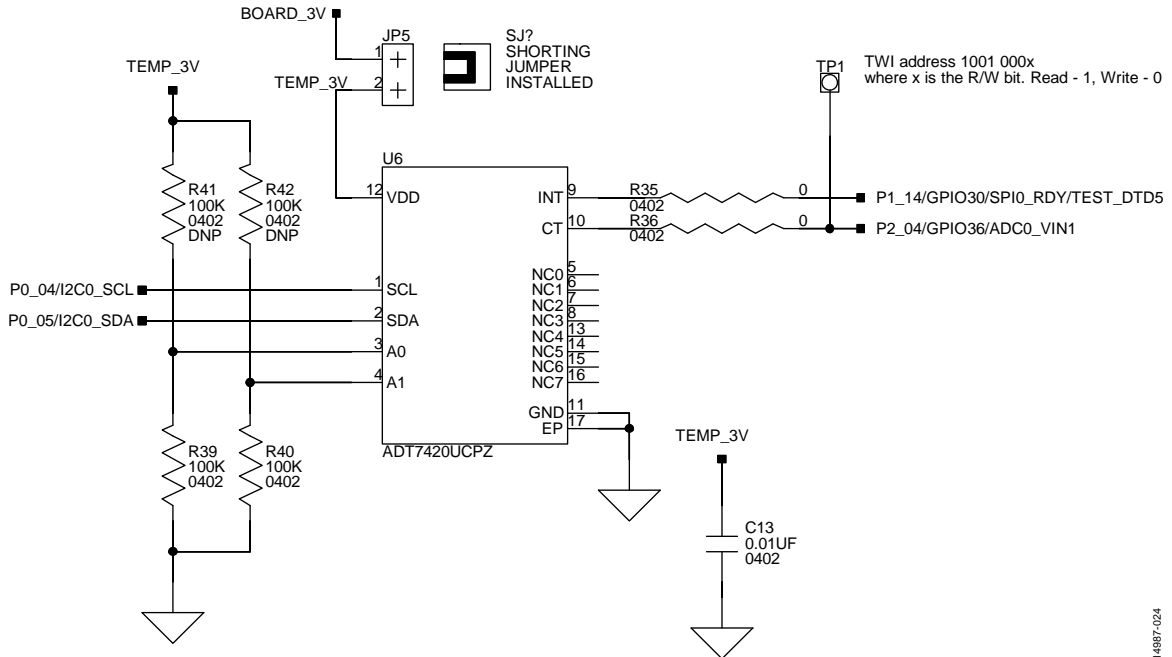


Figure 25. PC Temperature Sensor Circuit Diagram

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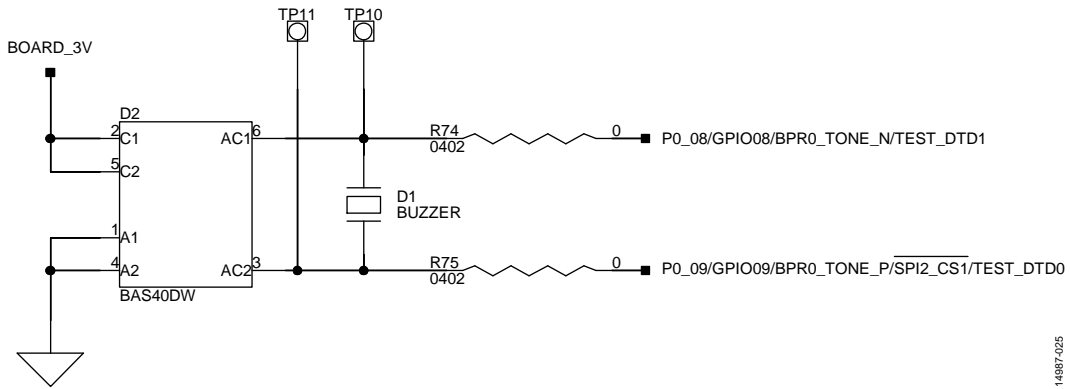


Figure 26. Buzzer Circuit Diagram

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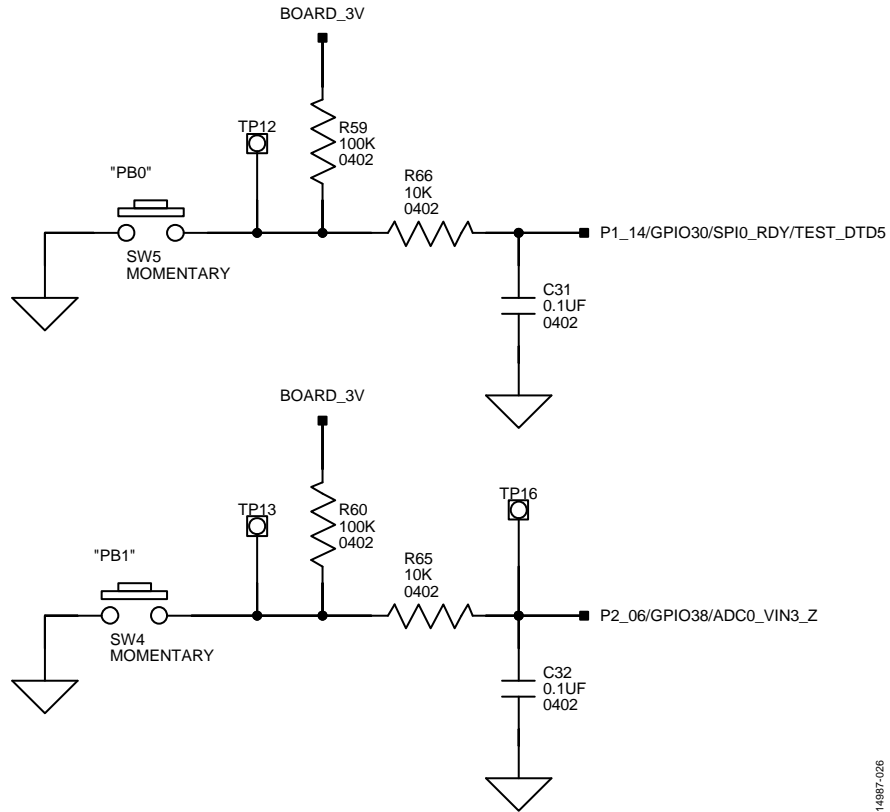


Figure 27. General-Purpose Buttons Circuit

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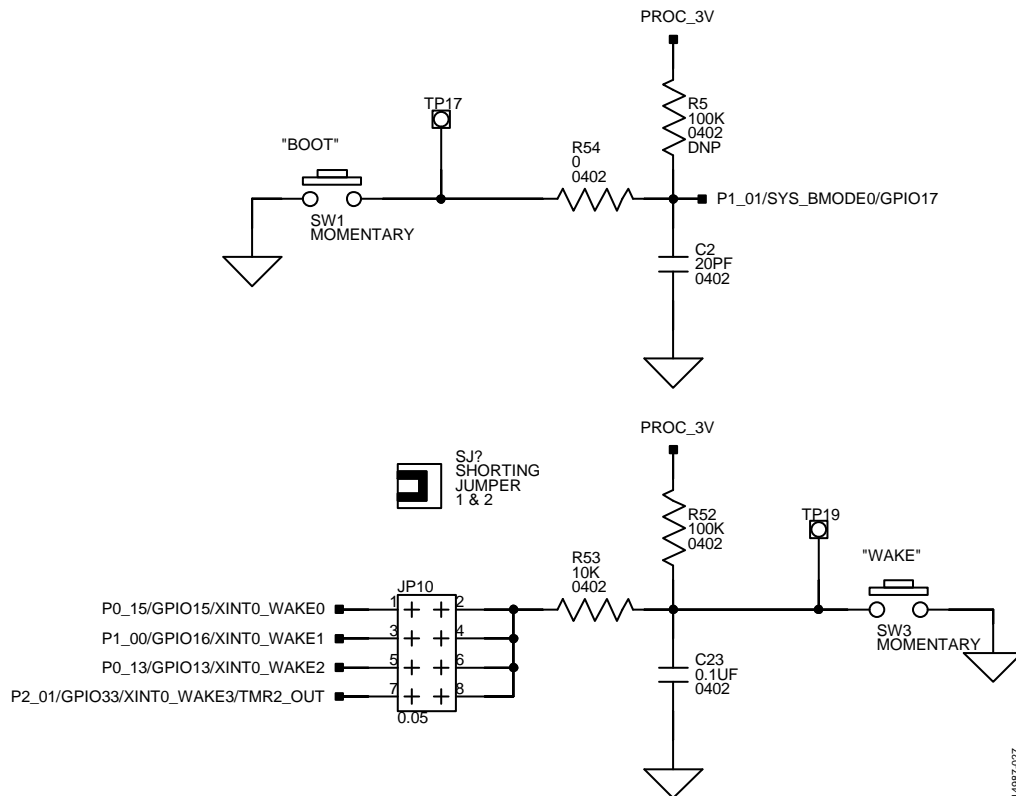


Figure 28. Boot and Wake Button Circuit

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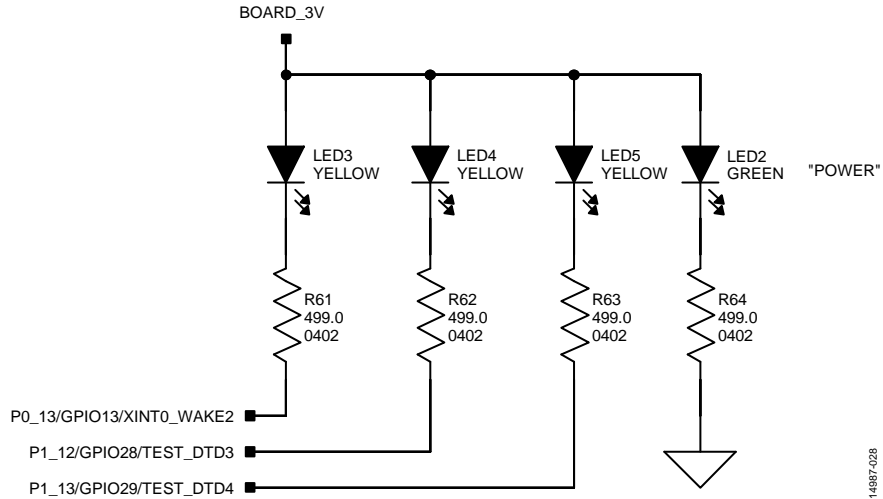


Figure 29. LED Circuit Schematic

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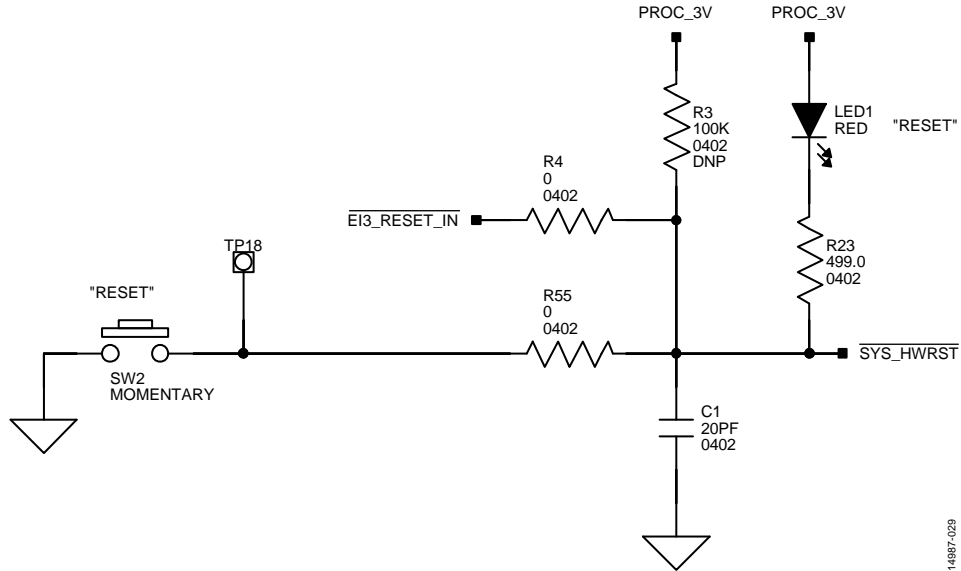


Figure 30. RESET Circuit Schematic

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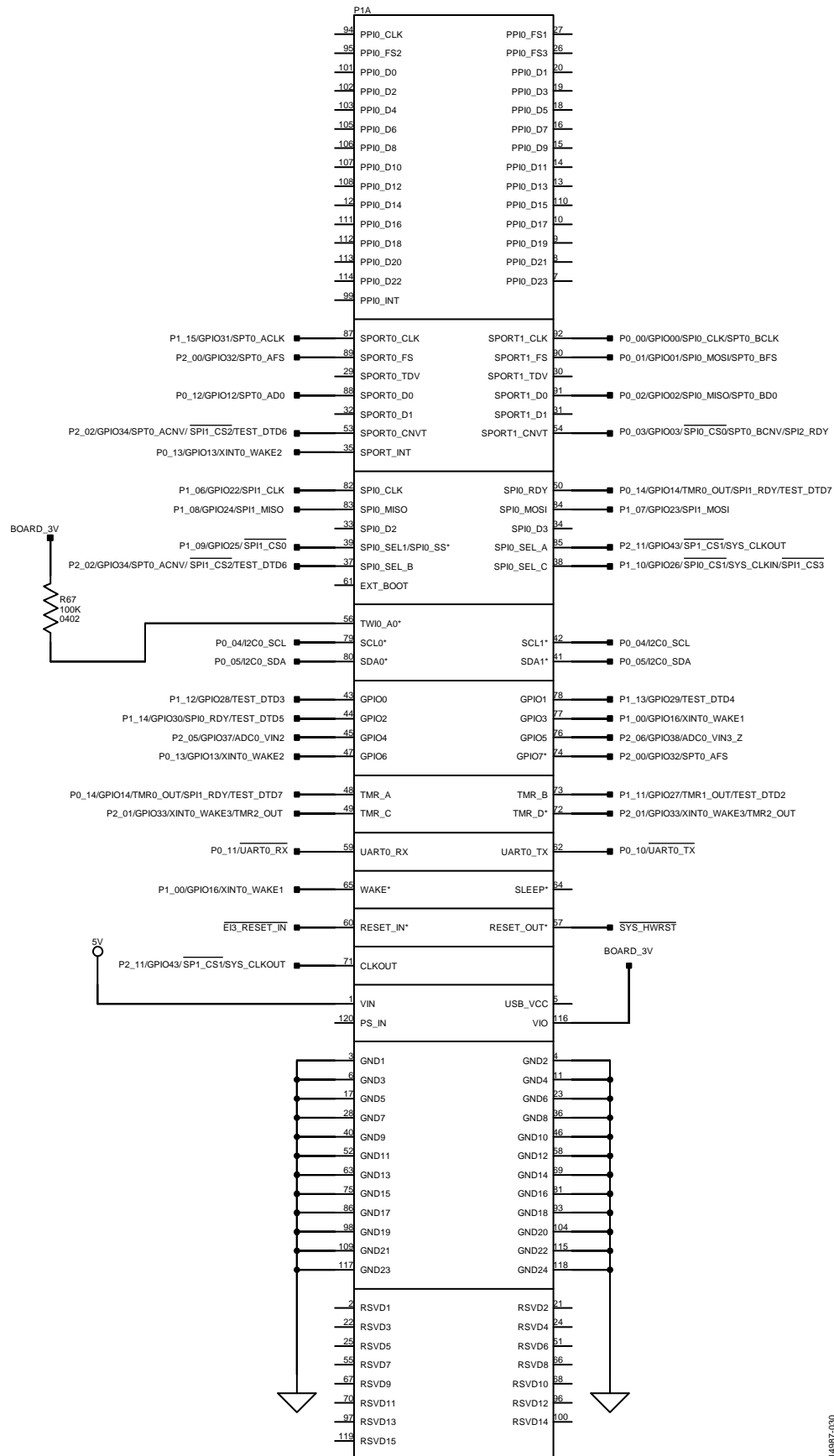


Figure 31. E13 Schematic and Pin Diagram

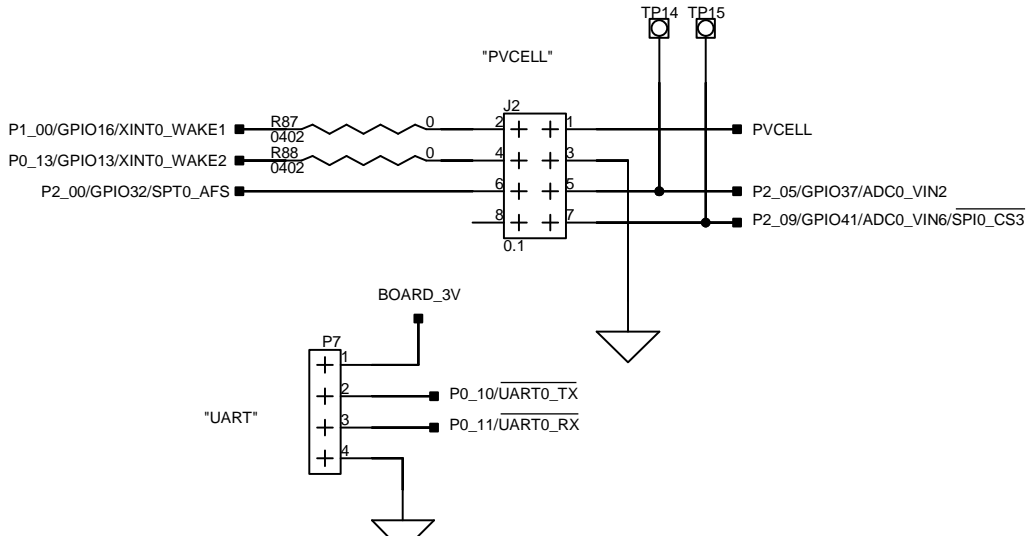


Figure 32. PV Cell Connector and UART (P7) Connector Schematic

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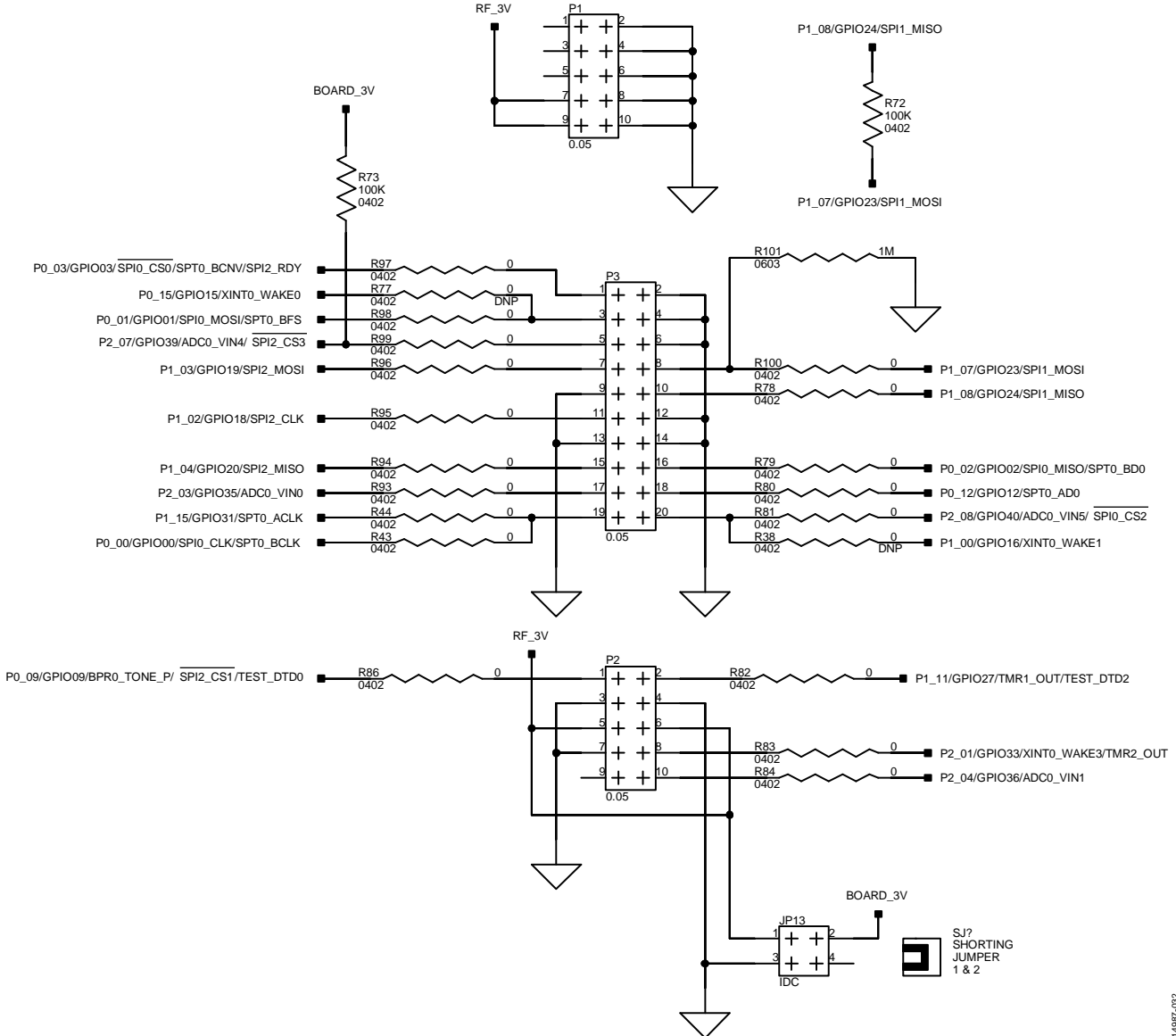


Figure 33. Wireless Transceiver Interface Schematic
Rev. A | Page 18 of 24

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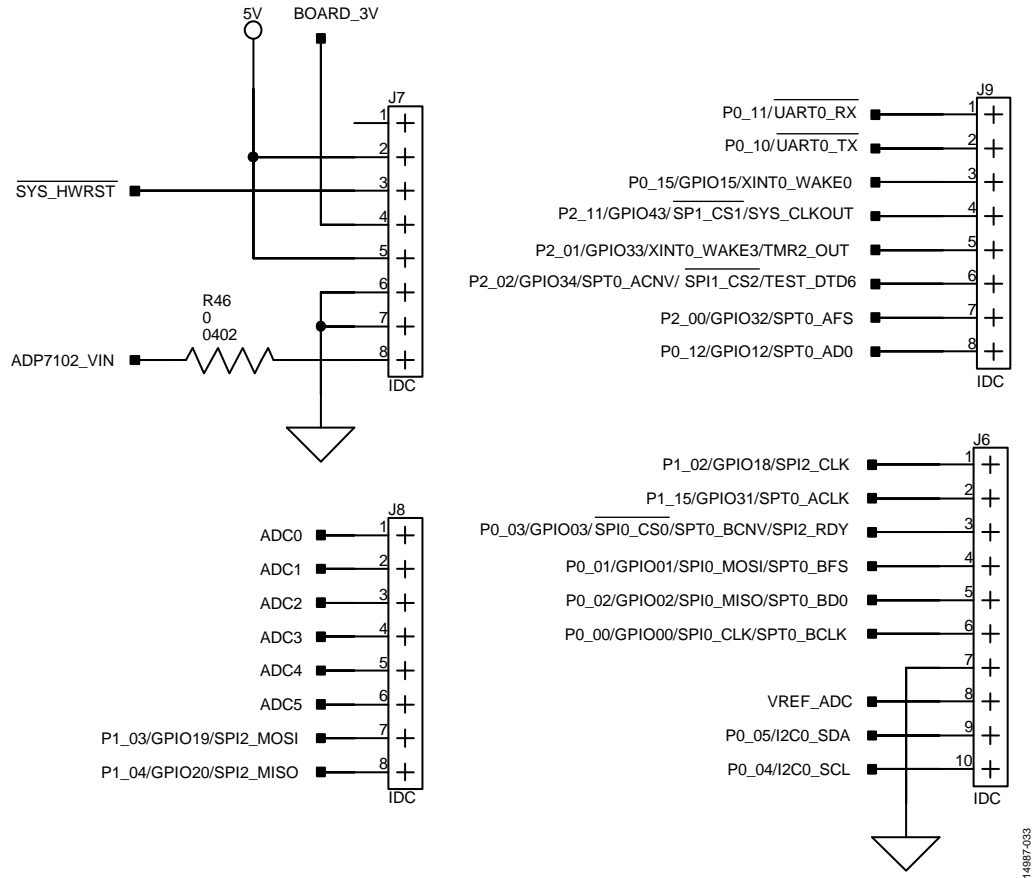


Figure 34. Arduino Headers Schematics

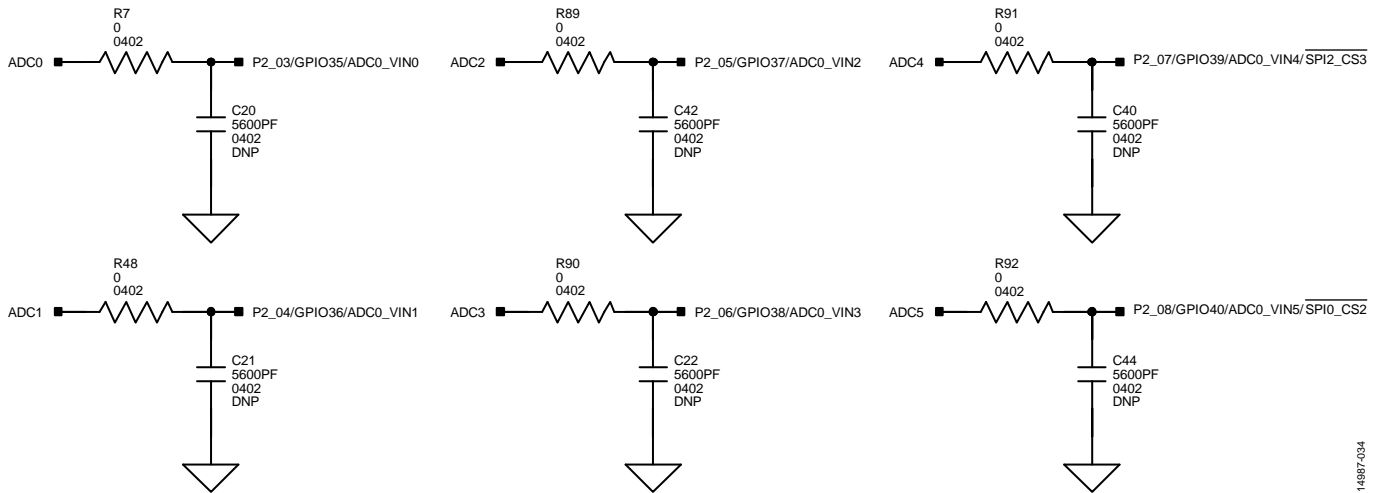


Figure 35. Arduino Analog Interface Schematic

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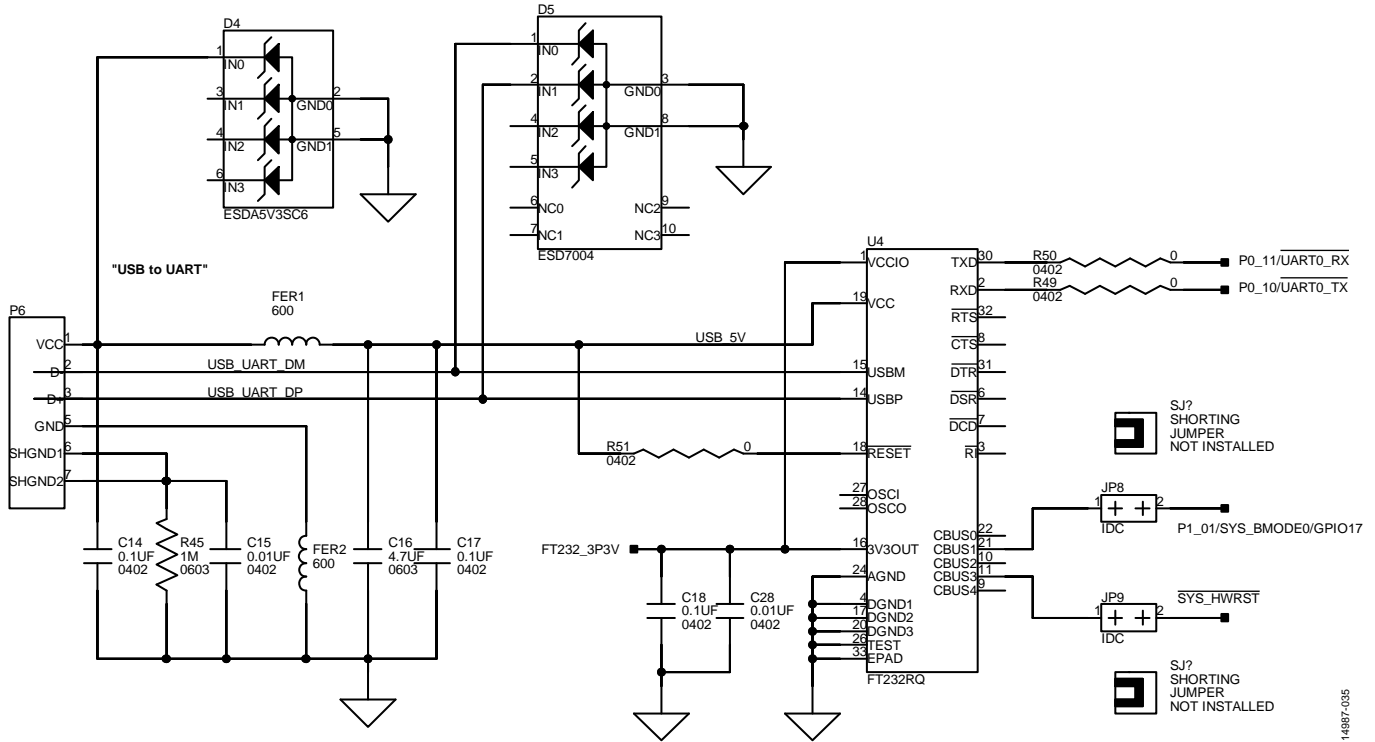


Figure 36. USB to UART Circuit Schematic

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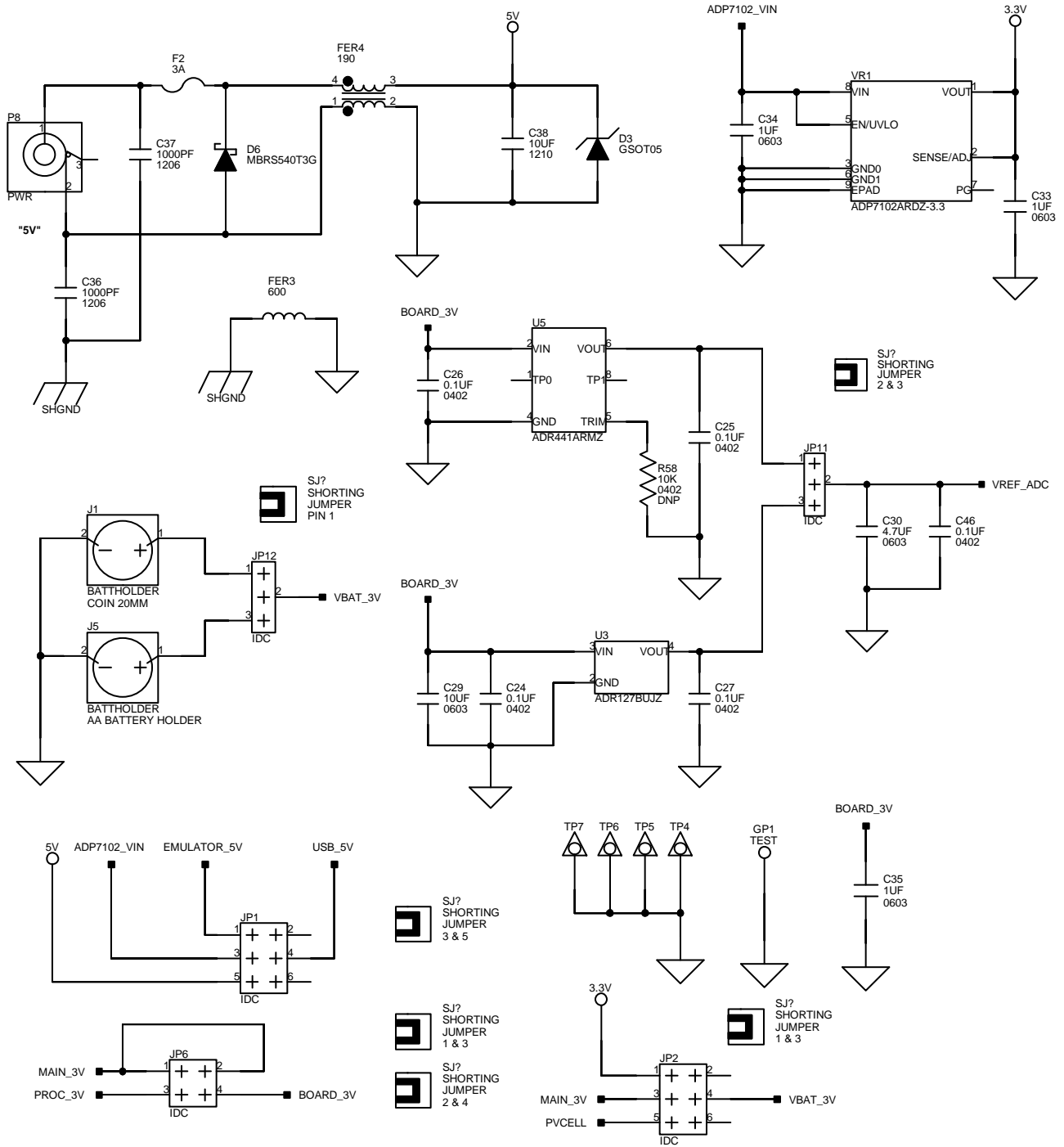


Figure 37. Power Circuit and Connectors Schematic

ORDERING INFORMATION

BILL OF MATERIALS

Table 9. Bill of Materials

Qty	Description	Reference Designator	Manufacturer	Part Number
1	W25Q32 SO8W	U7	Winbond	W25Q32FVSSIG
1	FT232RQ QFN50P500X500-33NA	U4	Digi-Key	768-1008-1-ND
1	ADP7102ARDZ-3.3 SOIC127P600-9N	VR1	Analog Device	ADP7102ARDZ-3.3-R7
1	ADT7420UCPZ 16-lead LFCSP	U6	Analog Devices	ADT7420UCPZ
1	26 MHz SMT	Y2	Digi-Key	535-10298-2-ND
1	32.768 kHz SMT	Y1	EPSON	MC-306 32.768K-E3:ROHS
1	ADuCM3029 64-lead LFCSP	U1	Analog Devices	ADuCM3029BCPZ
1	ADR127BUJZ SOT95P280X100-6N	U3	Analog Devices	ADR127BUJZ-R2
1	ADR441ARMZ 8-lead MSOP	U5	Analog Devices	ADR441ARMZ
1	ADXL363BCCZ 16-lead LFCSP	U2	Analog Devices	ADXL363BCCZ
1	Buzzer 75 dB, 3 V, 4 kHz	D1	Digi-Key	490-4683-2-ND
5	IDC 2 × 1, IDC 2 × 1	JP3 to JP5, JP8, JP9	Samtec	HTSW-102-07-T-S
2	IDC 3 × 1, IDC 3 × 1	JP11, JP12	Samtec	HTSW-103-07-T-S
3	IDC 8 × 1, IDC 8 × 1	J7 to J9	Samtec	SSW-108-01-TM-S
1	3 A resettable FUS004	F2	TE Connectivity Ltd.	SMD300F-2
1	IDC 2-pin_JUMPER_SHORT	SJ	Digi-Key	S9001-ND
2	IDC 2 × 2, IDC 2 × 2	JP6, JP13	Amphenol FCI	68737-404HLF
2	IDC 3 × 2, IDC 3 × 2	JP1, JP2	Amphenol FCI	54102-T08-03LF
1	PWR 0.65 mm CON045	P8	Digi-Key	CP1-023-ND
1	IDC 4 × 1, IDC 4 × 1	P7	Amphenol FCI	54101-T08-04LF
1	0.6 mm, 120-pin HIROSE_FX8-120PSV1(91)	P1A	HIROSE	FX8-120P-SV1(91)a
1	USB 5-pin CON069	P6	Digi-Key	H11589CT-ND
2	0.05 inch, 5 × 2, SAMTEC_TFM-105-02-S-DA	P1, P2	Samtec	TFM-105-02-S-D-A
1	0.05 inch, 10 × 2, SAMTEC_TFM-110-02-S-DA	P3	Samtec	TFM-110-02-S-D-A
1	Test Loop LOOP_2838	GP1	Keystone Electronics	5016
1	IDC 10X2 TE_5103308-5	P4	Mouser	571-5103308-5
2	SMC THREADED AMPHENOL_152119	J3, J4	Amphenol FCI	152119
2	0.05, 10-pin SAMTEC_SHF-105-01-L-D TH	P5, P9	Samtec	SHF-105-01-L-D-TH-TR
1	0.1, 8-pin HARWIN_M20-7880446	J2	Digi-Key	952-1787-ND
1	BATT-HOLDER 20 mm BATT_BS-3	J1	MPD	BS-3
1	0.05, 4 × 2 IDC 4 × 2	JP10	Amphenol FCI	20021121-00008C4LF
5	MOMENTARY SW_ADTSMW64	SW1 to SW5	Digi-Key	679-2310-2-ND
1	IDC 10 × 1 SAMTEC_SSW-110-01-T-S	J6	Samtec	SSW-110-01-T-S
1	BATT HOLDER AA BATT_2460	J5	Keystone Electronics	2460
3	600 Ω, 500 mA, 1206	FER1 to FER3	LairdTech	HZ1206B601R-10
6	0 Ω, 1/8 W, 5%, 0805	R8, R13, R18 to R21	Vishay	CRCW08050000Z0EA
1	0 Ω, 1/8 W, 5%, 0805	R16	Vishay	CRCW08050000Z0EA
1	190 Ω, 5 A, FER002	FER4	Murata	DLW5BSN1915SQ2
17	0.1 μF, 10 V, 10%, 0402, X5R	C4, C5, C14, C17, C18, C23 to C27, C31, C32, C39, C41, C43, C45, C47	AVX Corp.	0402ZD104KAT2A
4	0.01 μF, 16 V, 10%, 0402, X7R	C11, C13, C15, C28	AVX Corp.	0402YC103KAT2A

Qty	Description	Reference Designator	Manufacturer	Part Number
3	10 k Ω , 1/16 W, 5%, 0402	R53, R65, R66	Vishay	CRCW040210K0FKED
1	10 k Ω , 1/16 W, 5%, 0402	R58	Vishay	CRCW040210K0FKED
58	0 Ω , 1/10 W, 5%, 0402	R1, R2, R4, R6, R7, R9 to R12, R14, R15, R17, R31 to R37, R43, R44, R46, R48 to R51, R54 to R57, R69 to R71, R74, R75, R78 to R84, R86 to R100, R102	Panasonic	ERJ-2GE0R00X
3	0 Ω , 1/10 W, 5%, 0402	R38, R77, R85	Panasonic	ERJ-2GE0R00X
1	1 μ F, 16 V, 10%, 0603, X5R	C35	Digi-Key	399-5090-2-ND
1	4.7 μ F, 6.3 V, 20%, 0603, X5R	C16	AVX Corp.	06036D475MAT2A
2	1 M, 1/10 W, 5%, 0603	R45, R101	Vishay	CRCW06031M00JNEA
1	10 μ F, 16 V, 10%, 1210, X5R	C38	AVX Corp.	1210YD106KAT2A
2	1000 pF, 50 V, 5%, 1206	C36, C37	AVX Corp.	12065A102JAT2A
1	5 A, MBR5540T3G SMC	D6	ON Semiconductors	MBRS540T3G
15	100 k Ω , 1/16 W, 5%, 0402	R26 to R30, R39, R40, R52, R59, R60, R67, R68, R72, R73, R76	Digi-Key	541-100KJTR-ND
4	100 k Ω , 1/16 W 5%, 0402	R3, R5, R41, R42	Digi-Key	541-100KJTR-ND
1	30 A, GSOT05 SOT23-3	D3	Vishay	GSOT05-E3-08
3	2.2 k Ω , 1/10 W, 5%, 0402	R24, R25	Panasonic	ERJ-2GEJ222X
1	Green LED_0603	LED2	Digi-Key	67-1549-2-ND
5	499.0 Ω , 1/10 W, 1%, 0402	R23, R61 to R64	Panasonic	ERJ-2RKF4990X
1	0.1 μ F, 16 V, 10%, 0402, X7R	C46	Digi-Key	587-1451-2-ND
1	15 kV, ESD7004 DFN50P250X100-10N	D5	ON Semiconductors	ESD7004MUTAG
1	0.0 Ω , 1/10 W, 1%, 0603	R22	FEC	933-1662
1	Red LED_0603	LED1	Digi-Key	475-2512-2-ND
3	Yellow LED_0603	LED3 to LED5	Digi-Key	475-2793-1-ND
2	10 μ F, 6.3 V, 20%, 0603, X5R	C8, C29	Digi-Key	490-3896-2-ND
2	0.1 μ F, 35 V, 10%, 0402, X7R	C12, C19	Digi-Key	445-6901-2-ND
1	15 kV, ESDA5V3SC6 SOT95P280X145-6N	D4	Digi-Key	497-6633-1-ND
1	200 mA BAS40DW SOT-363	D2	Diodes Inc.	BAS40DW-04-7-F
2	1 μ F, 10 V, 10%, 0603, X7R	C33, C34	Digi-Key	587-1242-2-ND
2	8 pF, 16 V, \pm 0.5 pF, 0402, COG	C9, C10	AVX Corp.	0402YA8R0DAT2A
4	20 pF, 16 V, \pm 5%, 0402, COG	C1, C2, C7, C48	AVX Corp.	0402YA200JAT2A
2	0.47 μ F, 16 V, 10%, 0402, JB	C3, C6	Digi-Key	445-10942-2-ND
1	4.7 μ F, 10 V, 10%, 0603, X6S	C30	Digi-Key	490-10464-2-ND

NOTES

**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.

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