ANALOG DEVICES

ADZS-UCM3029EZLITE User Guide
UG-1044

One Technology Way • P.O. Box 9106 • Norwood, MA 02062-9106, U.S.A. • Tel: 781.329.4700 • Fax: 781.461.3113 • www.analog.com

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. This guide describes the different parts and components of the EZ-Kit evaluation board, the functionalities, and the configurations to enable the user to develop applications with the device.

DOCUMENTS NEEDED

ADuCM3029 EZ-Kit® Manual

GENERAL DESCRIPTION

The ADuCM3027/ADuCM3029 are ultra low power, integrated, mixed signal microcontroller systems (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 ECC and up to 64 kB of system RAM with parity.

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

Refer to the ADuCM3027/ADuCM3029 product page for future updates.
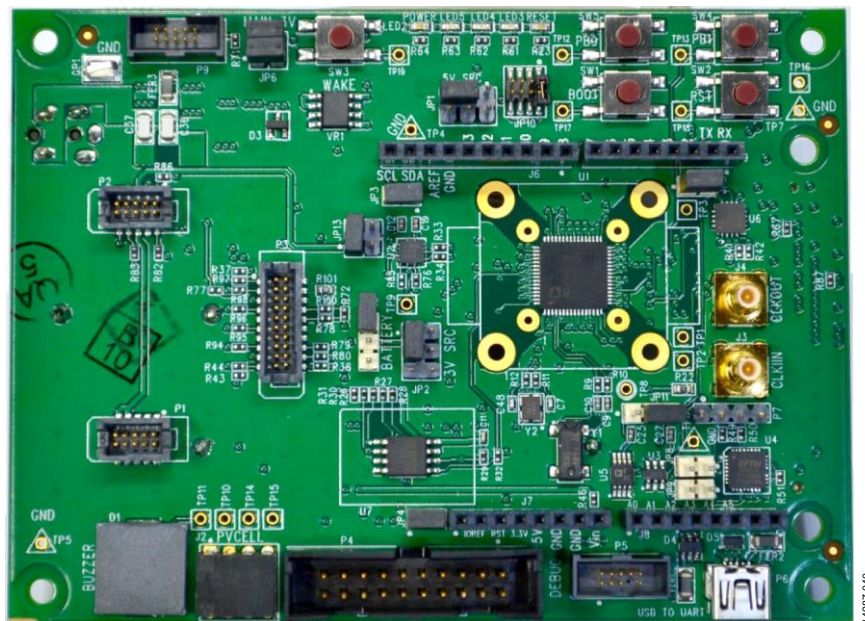
EVALUATION BOARD PHOTOGRAPH

Figure 1. ADuCM3027/ADuCM3029 Evaluation Board

PLEASE SEE THE LAST PAGE FOR AN IMPORTANT
WARNING AND LEGAL TERMS AND CONDITIONS.

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REVISION HISTORY

4/2017—Revision 0: Initial Version

7/2017—Revision A: Modified Package Contents

OVERVIEW

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

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 UART communication with the ADuCM3027/ADuCM3029 EZ-Kit board. Figure 3 shows a top view of the emulator board.
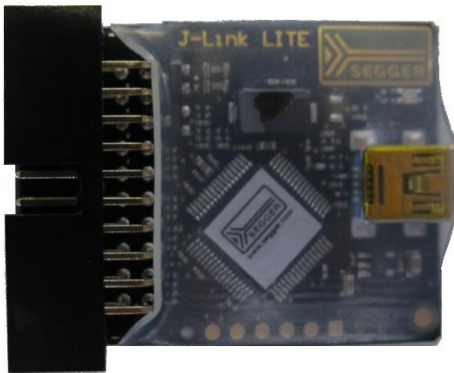

Figure 3. J-Link Lite Emulator

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 is used to provide a reset from the PC if required. Table 1 shows the JTAG connector pin configuration.

Table 1. JTAG Connector Pinouts

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

When measuring current consumption using an external supply on the ADuCM3027/ADuCM3029 EZ-Kit board IOVDD pins, it is recommended that the emulator be disconnected.

BOARD FEATURES

Power Supply

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

The following sources are the options for powering the board:

1. External power supply. The EZ-Kit board package has a 5 V dc regulated power adaptor included. To use this to supply the microcontroller, 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 be used to power the evaluation board while debugging and programming the micro-controller. Pin 1 and Pin 3 of JP1 and Pin 1 and Pin 3 of JP2 must be shorted to use this option. To power the board by this option, you must also command the J-link to power the board. Run the J-link commander, 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. The configuration for this setup is shorting 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, Pin 1 and Pin 2 of JP12 and Pin 3 and Pin 4 of JP2 must be shorted.
5. AA battery. To use an AA battery, Pin 2 and Pin 3 of JP12 and Pin 3 and Pin 4 of JP2 must be shorted.
6. PV Cell. The EZ-Kit board can be also be powered by energy harvesting kits by Analog Devices, Inc. To use this as an option, Pin 3 and Pin 5 of JP2 must be shorted.

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

Table 2. Power Option Configuration of EZ-Kit Board[1]

Sources	JP1	JP2	JP12
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, 4	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 LDO regulator before they power the components and the microcontroller in the board.

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

Power Indicator/General-Purpose LEDs

The EZ-Kit board has five light emitting diodes 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 microcontroller. 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 pin connections are described in Table 3.

Table 3. LED to MCU Pin Connections

LED	Pins
LED1	SYS_HWRST
LED2	N/A (LED2 is directly connected to the power line.)
LED3	P0_13, GPIO13, SYS_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 LFMUX, 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 of 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 is used to wake up the processor during low power modes. Depending on the configuration of JP10, the different external interrupts are used to wake up the microcontroller.
- 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 WAKE Switch

Signal	Pin
SYS_WAKE0	1, 2
SYS_WAKE1	3, 4
SYS_WAKE3	5, 6
SYS_WAKE4	7, 8

- The PB0 switch (SW5) is a general-purpose switch that is connected to the GPIO P1.14.
- The PB1 switch (SW4) is a general-purpose switch that is connected to the 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 micro-controllers 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 TTL levels.

The ADuCM3027/ADuCM3029 microcontrollers 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.
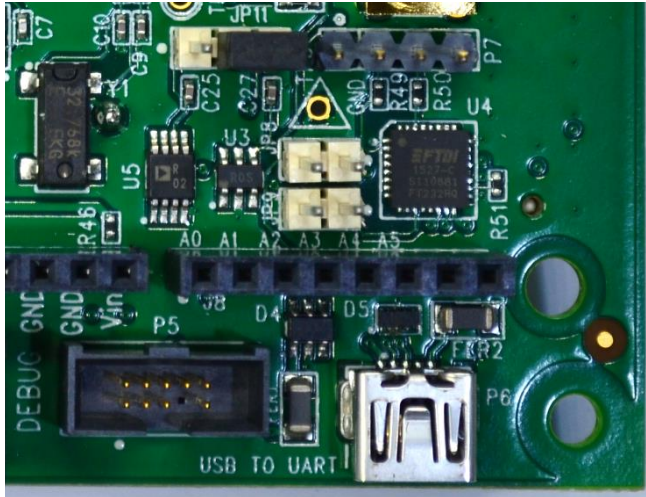
Figure 5. USB to UART Circuit

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

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

The entire system consumes less than 2 μA 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 microcontrollers by 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 can be used by tapping to R85 trace.

This circuit can be powered down by unshorting header JP3

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°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 μA, and in shutdown mode at 2.0 μA.

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

The ADT7420 is connected to the I²C0 interface and can generate an interrupt signal to interrupt the microcontroller. 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 be used to 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 microcontroller and can be disconnected to 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

On-Board Buzzer

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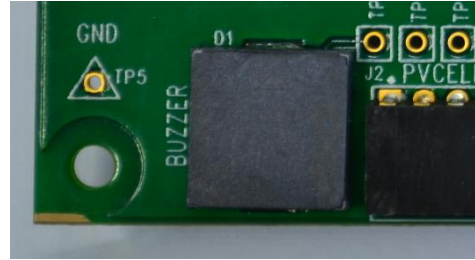

Figure 9. Buzzer Circuit

EZ-KIT BOARD CONNECTORS

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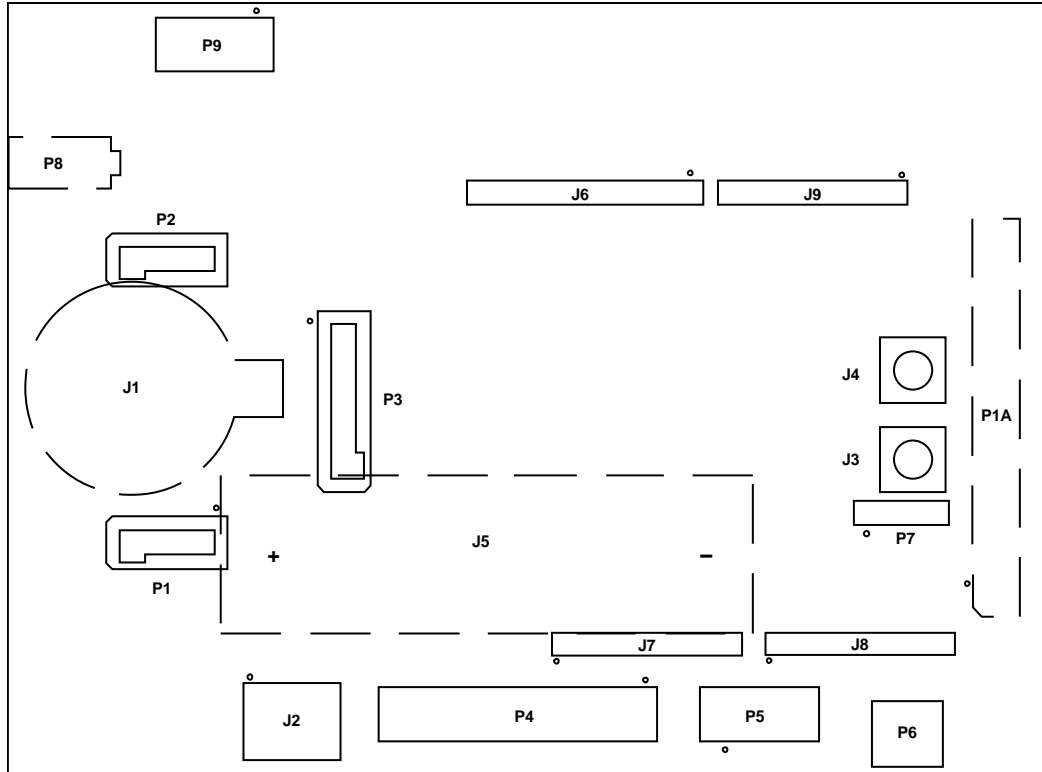

Figure 10. Connector Locations

ARDUINO UNO CONNECTORS (J6, J7, J8, 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 Number	Arduino Pin	ADuCM3027/ADuCM3029 Pin
1	8	P1_02/GPIO18/SPI2_CLK
2	9	P1_15/GPIO31
3	10	P0_03/GPIO03/SPI0_CS0
4	11	P0_01/GPIO01/SPI0_MOSI
5	12	P0_02/GPIO02/SPI0_MISO
6	13	P0_00/GPIO00/SPI0_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 Number	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 Number	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

Table 8. Arduino Interface J9 Connector Pinout

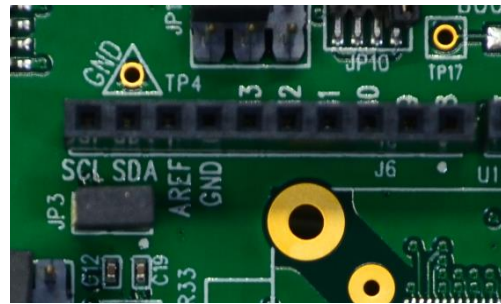| J9 Pin Number	Arduino Pin	ADuCM3027/ADuCM3029 Pin
1	0	P0_11/UART0_RX
2	1	P0_10/UART0_TX
3	2	P0_15/GPIO15
4	3	P2_11/GPIO43/SPI1_CS1
5	4	P2_01/GPIO33
6	5	P2_02/GPIO34/SPI1_CS2
7	6	P2_00/GPIO32
8	7	P0_12/GPIO12

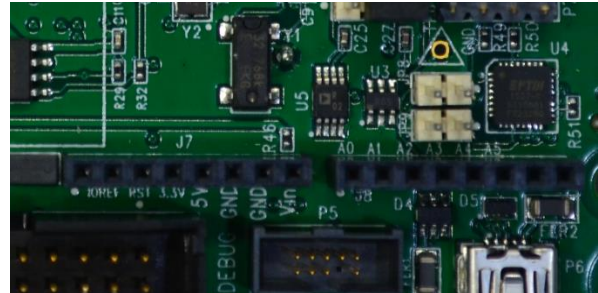*Figure 11. J6 Arduino Header (GPIO Pins, SPI and I²C)*

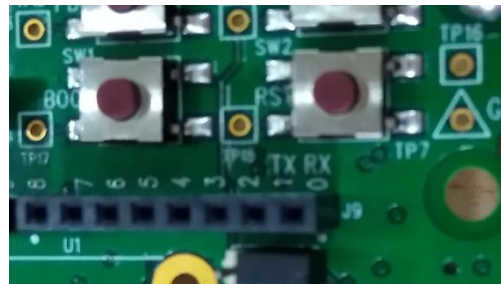*Figure 12. J7 and J8 Arduino Compatible Interface (Power and ADC)*

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 boards capabilities. The connectors provide power, ground, RESET, ADC, I²C, SPI, UART, SPORT and GPIO signals.

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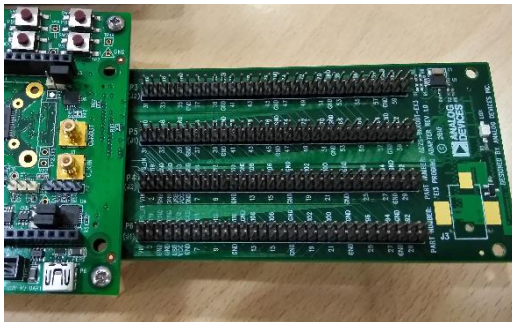

Figure 14. EI3 Connector

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.
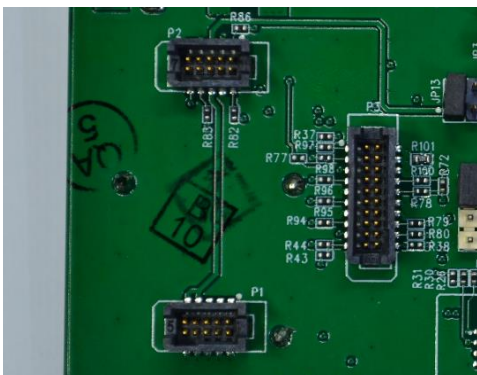

Figure 16. Wireless Transceiver Interface

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.
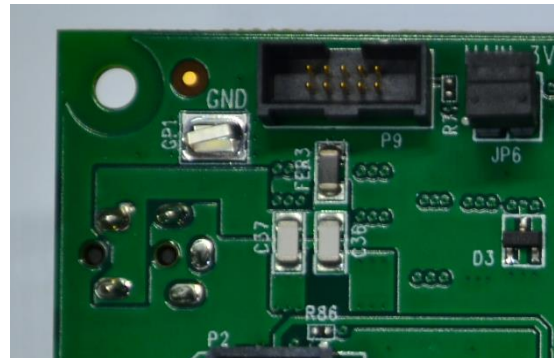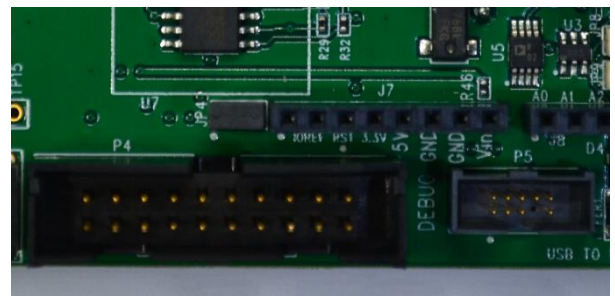

Figure 17. P9 Debug Connector

Figure 18. P4 and P5 Debug Connectors

EZ-KIT BOARD SYSTEM ARCHITECTURE

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

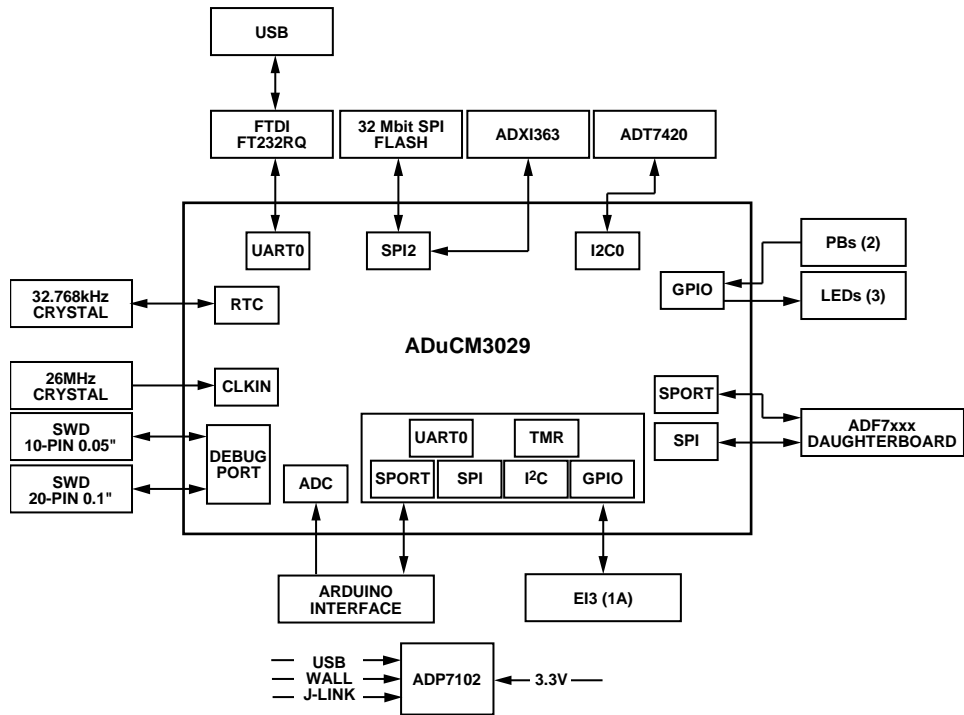*Figure 19. EZ-Kit Board Block Diagram*

EZ-KIT BOARD SCHEMATIC

Figure 20 through Figure 37 show the schematics of the EZ-Kit board.
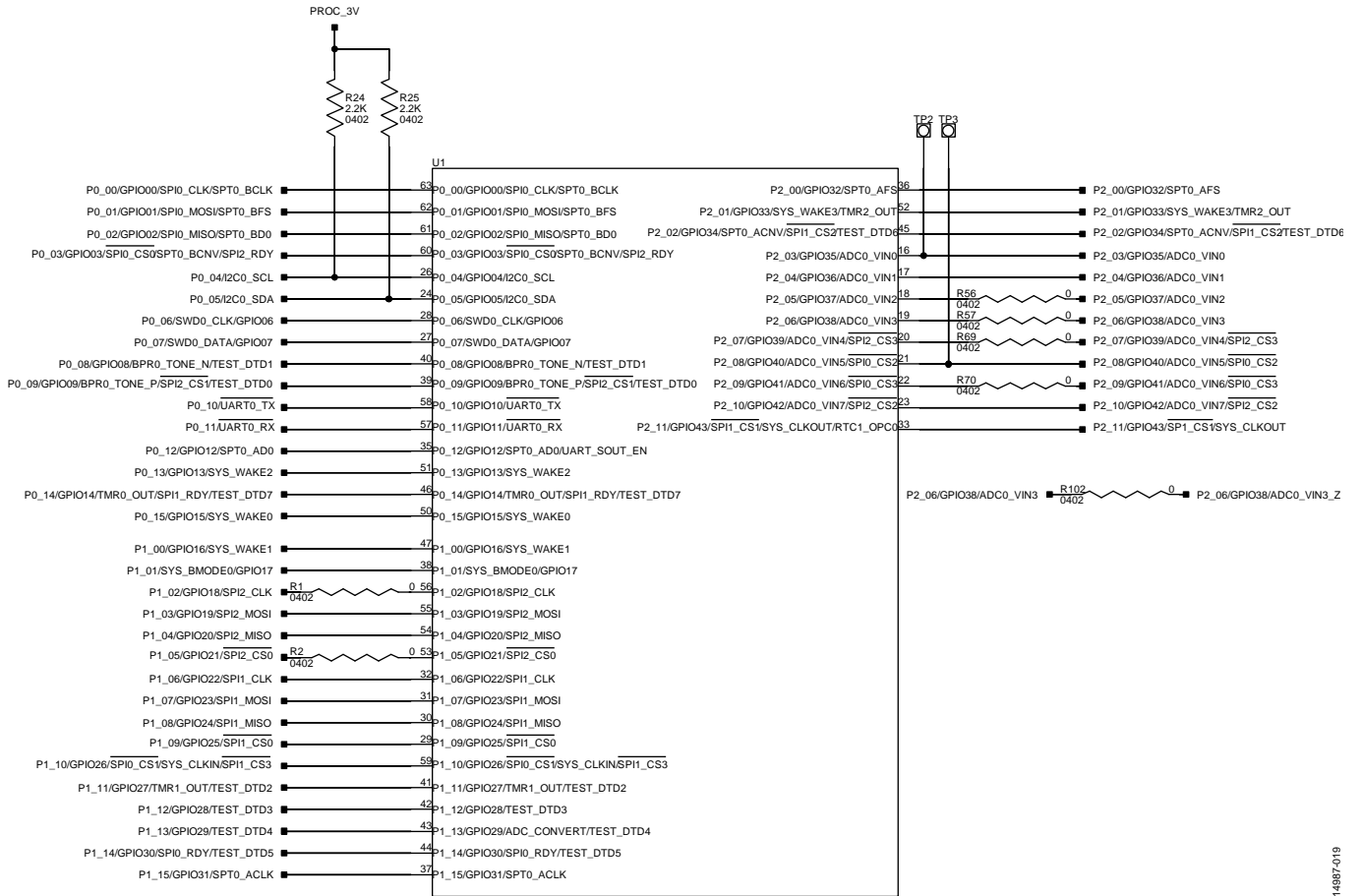
Figure 20. ADuCM3027/ADuCM3029 Microcontroller GPIO Schematic
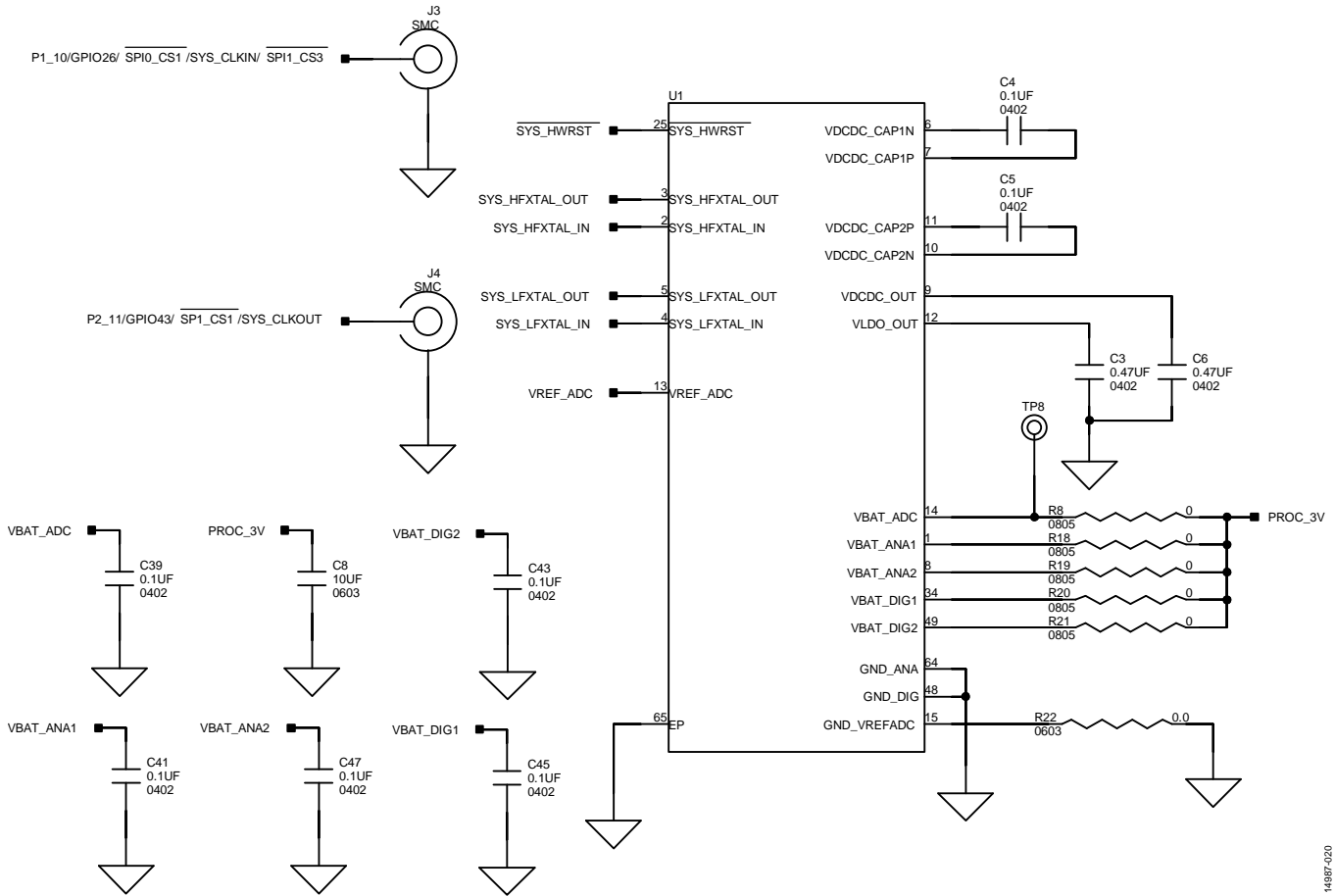
Figure 21. *ADuCM3027/ADuCM3029* Microcontroller Power and Reset Schematics
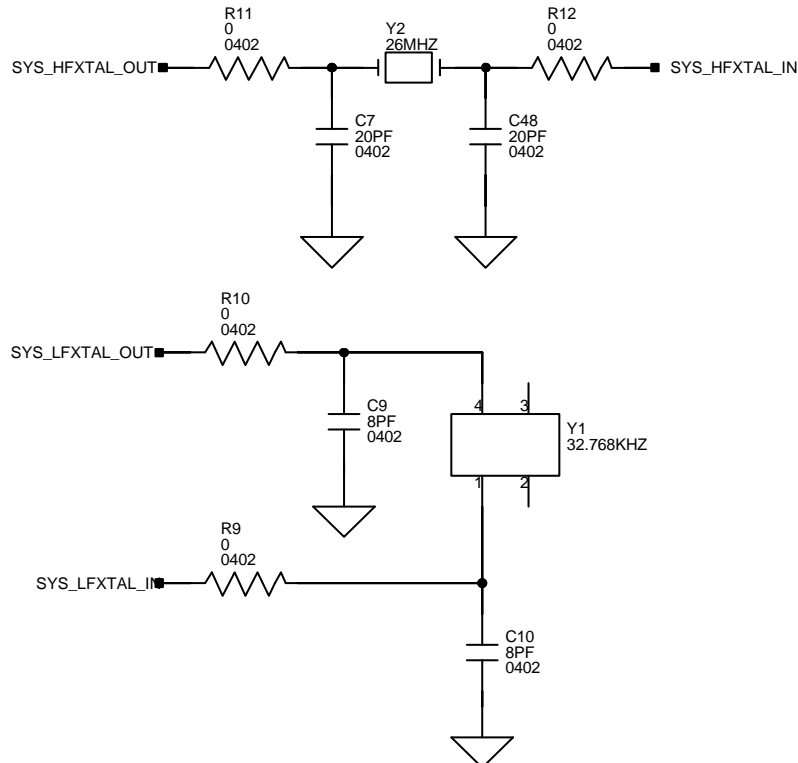

Figure 22. Crystal Circuit Figure

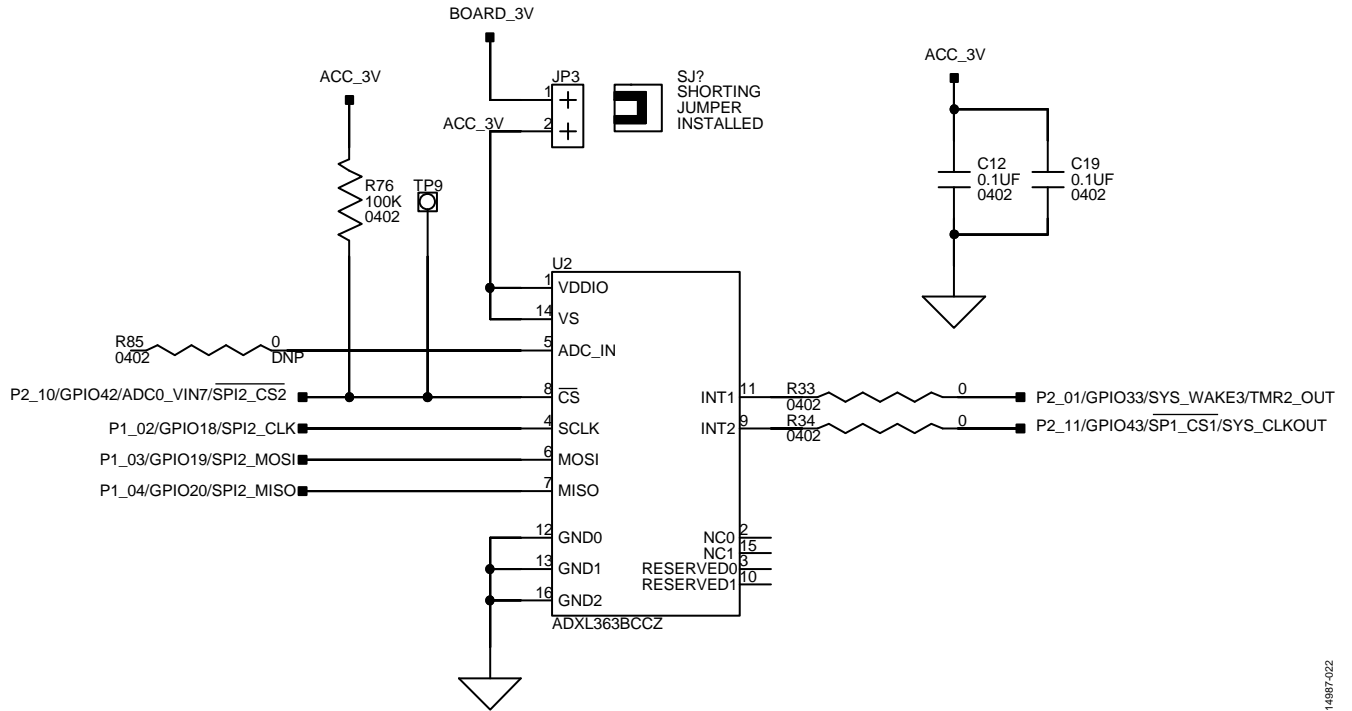*Figure 23. Tri Sensor Circuit*

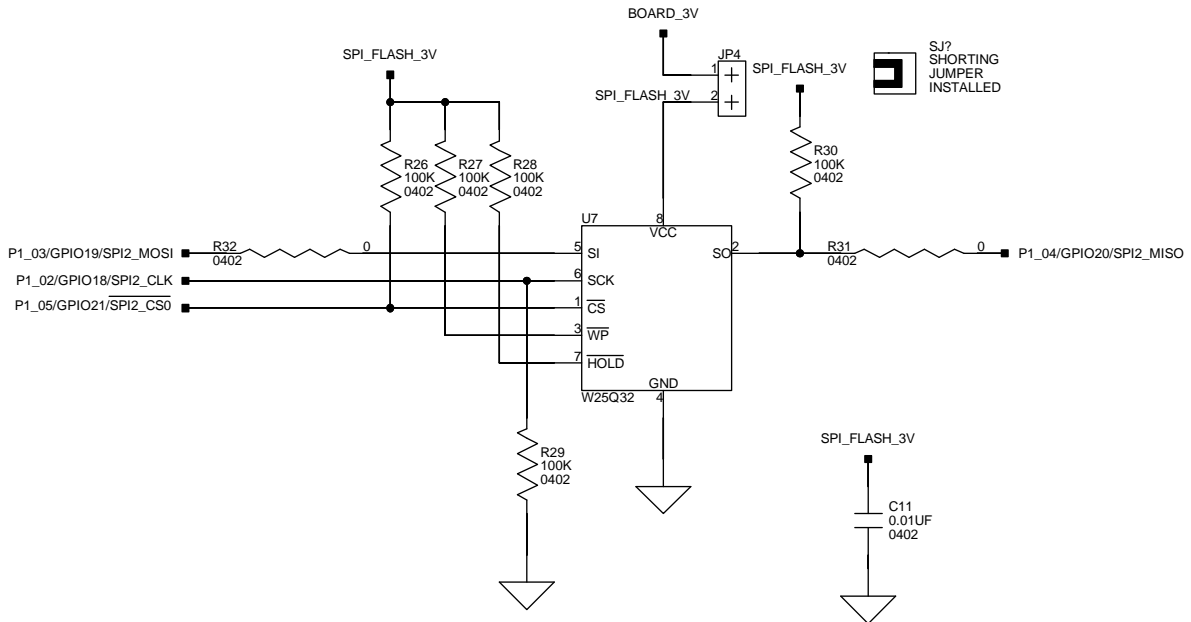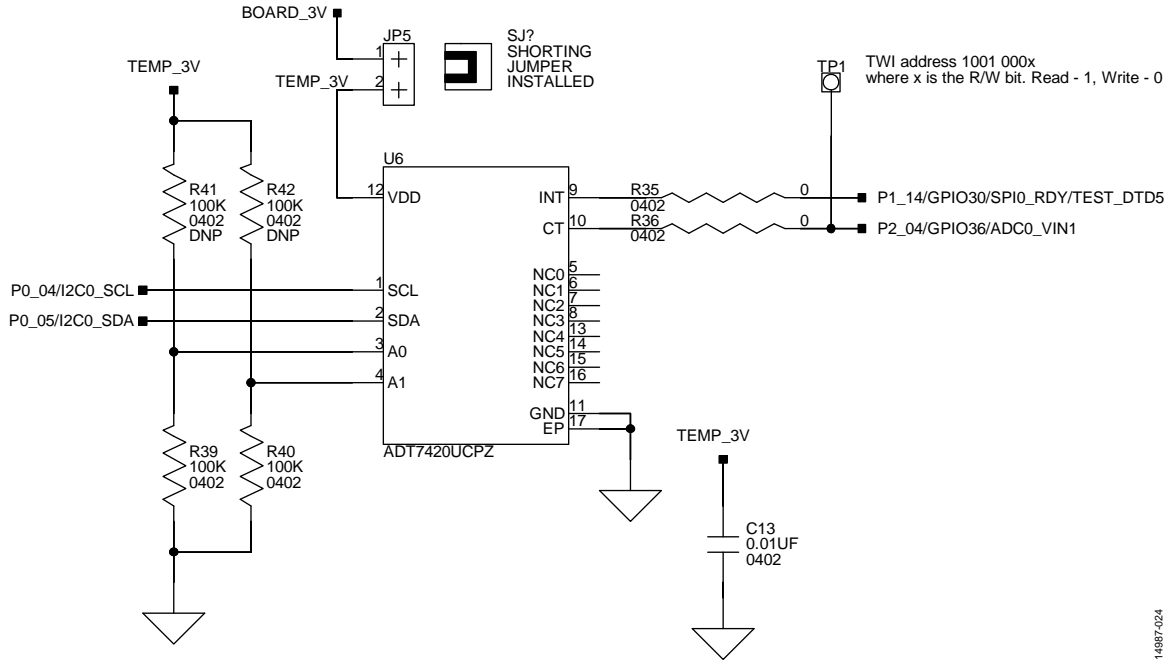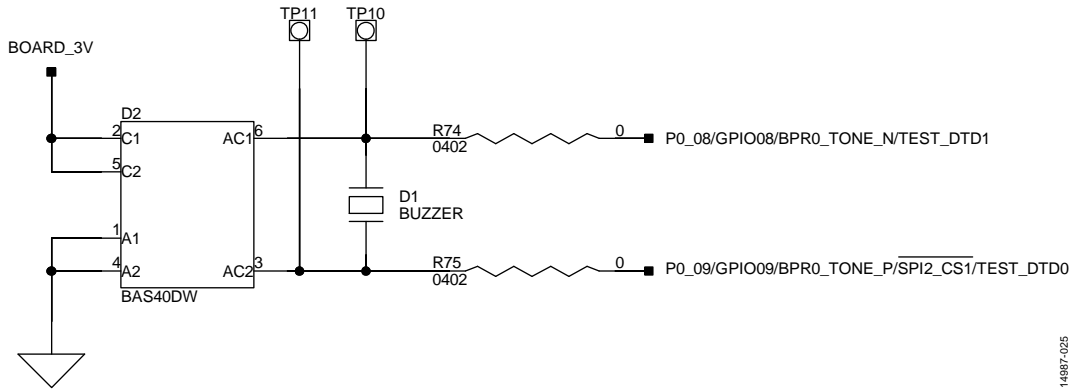*Figure 24. External Flash Circuit Diagram*

Figure 25. I²C Temperature Sensor Circuit Diagram

Figure 26. Buzzer Circuit Diagram

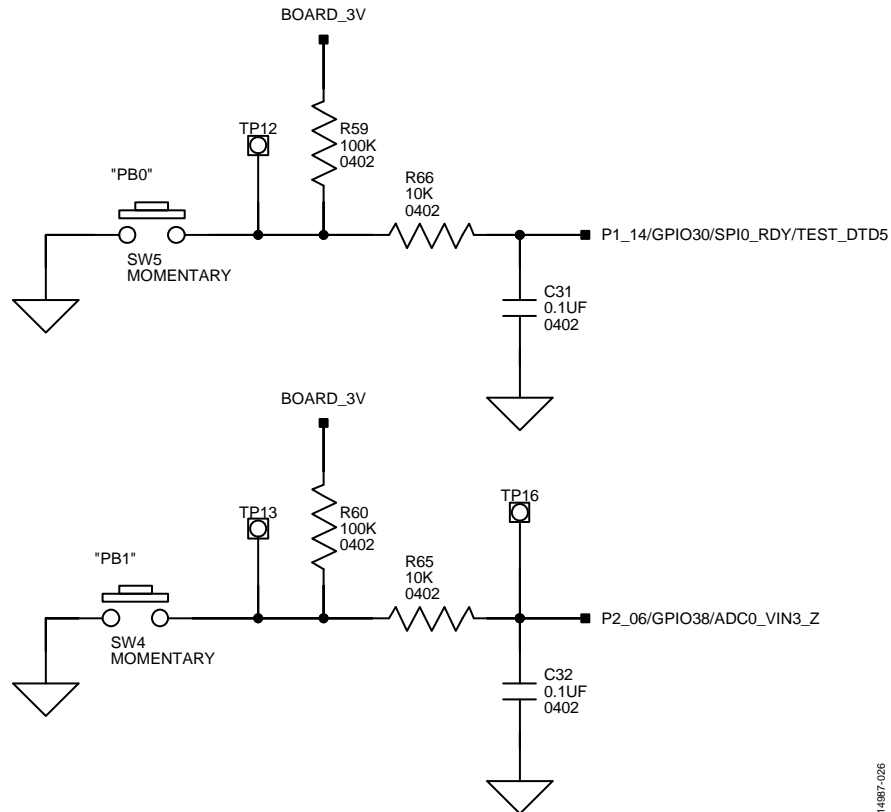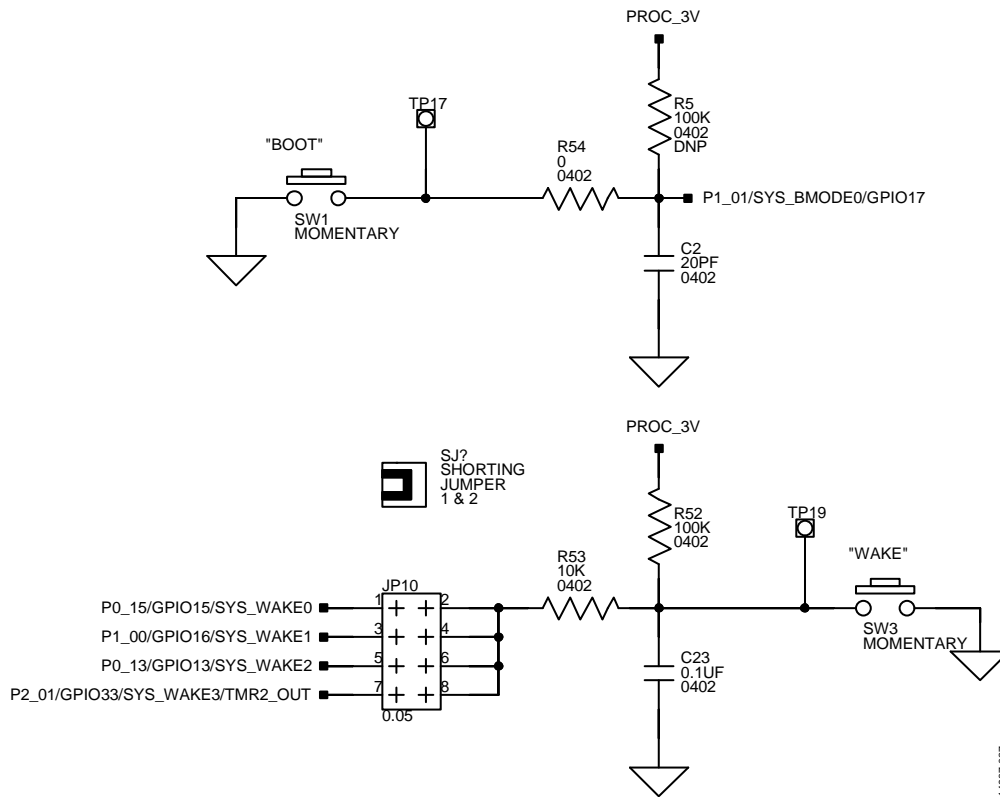*Figure 27. General-Purpose Buttons Circuit*
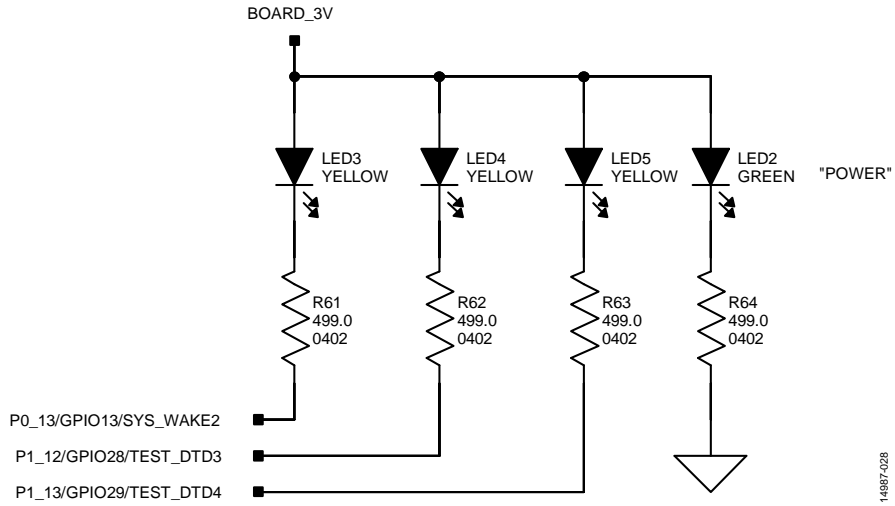

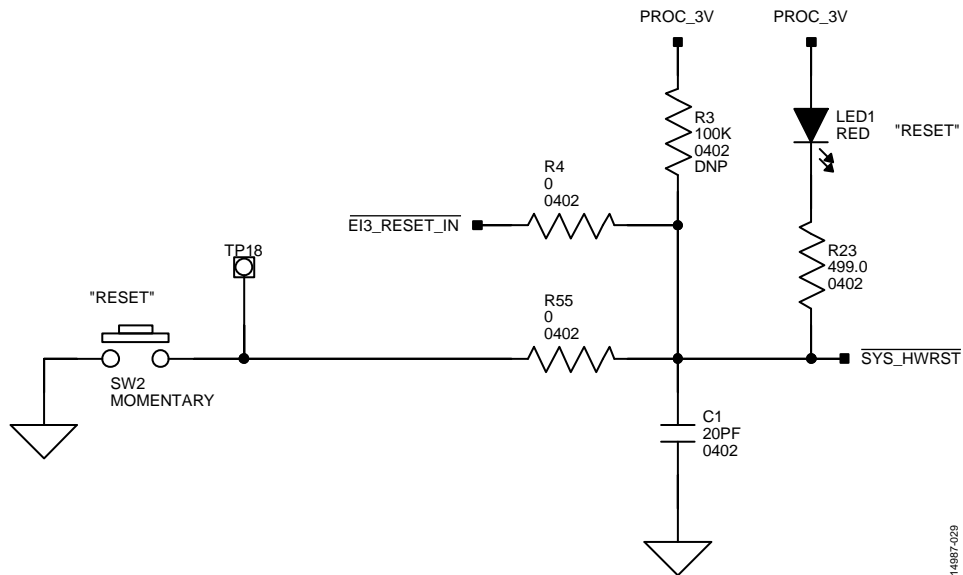*Figure 28. Boot and Wake Button Circuit*

Figure 29. LED Circuit Schematic

Figure 30. RESET Circuit Schematic

P1A

94	PPI0_CLK	PPI0_FS1	27
95	PPI0_FS2	PPI0_FS3	26
101	PPI0_D0	PPI0_D1	20
102	PPI0_D2	PPI0_D3	19
103	PPI0_D4	PPI0_D5	18
105	PPI0_D6	PPI0_D7	16
106	PPI0_D8	PPI0_D9	15
107	PPI0_D10	PPI0_D11	14
108	PPI0_D12	PPI0_D13	13
12	PPI0_D14	PPI0_D15	110
111	PPI0_D16	PPI0_D17	10
112	PPI0_D18	PPI0_D19	9
113	PPI0_D20	PPI0_D21	8
114	PPI0_D22	PPI0_D23	7
99	PPI0_INT		

P1_15/GPIO31/SPT0_ACLK — 87 SPORT0_CLK | SPORT1_CLK 92 — P0_00/GPIO00/SPI0_CLK/SPT0_BCLK
P2_00/GPIO32/SPT0_AFS — 89 SPORT0_FS | SPORT1_FS 90 — P0_01/GPIO01/SPI0_MOSI/SPT0_BFS
29 SPORT0_TDV | SPORT1_TDV 30
P0_12/GPIO12/SPT0_AD0 — 88 SPORT0_D0 | SPORT1_D0 91 — P0_02/GPIO02/SPI0_MISO/SPT0_BD0
32 SPORT0_D1 | SPORT1_D1 31
P2_02/GPIO34/SPT0_ACNV/ SPI1_CS2/TEST_DTD6 — 53 SPORT0_CNVT | SPORT1_CNVT 54 — P0_03/GPIO03/ SPI0_CS0/SPT0_BCNV/SPI2_RDY
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P1_08/GPIO24/SPI1_MISO — 83 SPI0_MISO | SPI0_MOSI 84 — P1_07/GPIO23/SPI1_MOSI
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P2_05/GPIO37/ADC0_VIN2 — 45 GPIO4 | GPIO5 76 — P2_06/GPIO38/ADC0_VIN3_Z
P0_13/GPIO13/SYS_WAKE2 — 47 GPIO6 | GPIO7* 74 — P2_00/GPIO32/SPT0_AFS

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P2_01/GPIO33/SYS_WAKE3/TMR2_OUT — 49 TMR_C | TMR_D* 72 — P2_01/GPIO33/SYS_WAKE3/TMR2_OUT

P0_11/UART0_RX — 59 UART0_RX | UART0_TX 62 — P0_10/UART0_TX

P1_00/GPIO16/SYS_WAKE1 — 65 WAKE* | SLEEP* 64

EI3_RESET_IN — 60 RESET_IN* | RESET_OUT* 57 — SYS_HWRST

5V
P2_11/GPIO43/ SP1_CS1/SYS_CLKOUT — 71 CLKOUT
BOARD_3V

1 VIN | USB_VCC 5
120 PS_IN | VIO 116

3	GND1	GND2	4
6	GND3	GND4	11
17	GND5	GND6	23
28	GND7	GND8	36
40	GND9	GND10	46
52	GND11	GND12	58
63	GND13	GND14	69
75	GND15	GND16	81
86	GND17	GND18	93
98	GND19	GND20	104
109	GND21	GND22	115
117	GND23	GND24	118

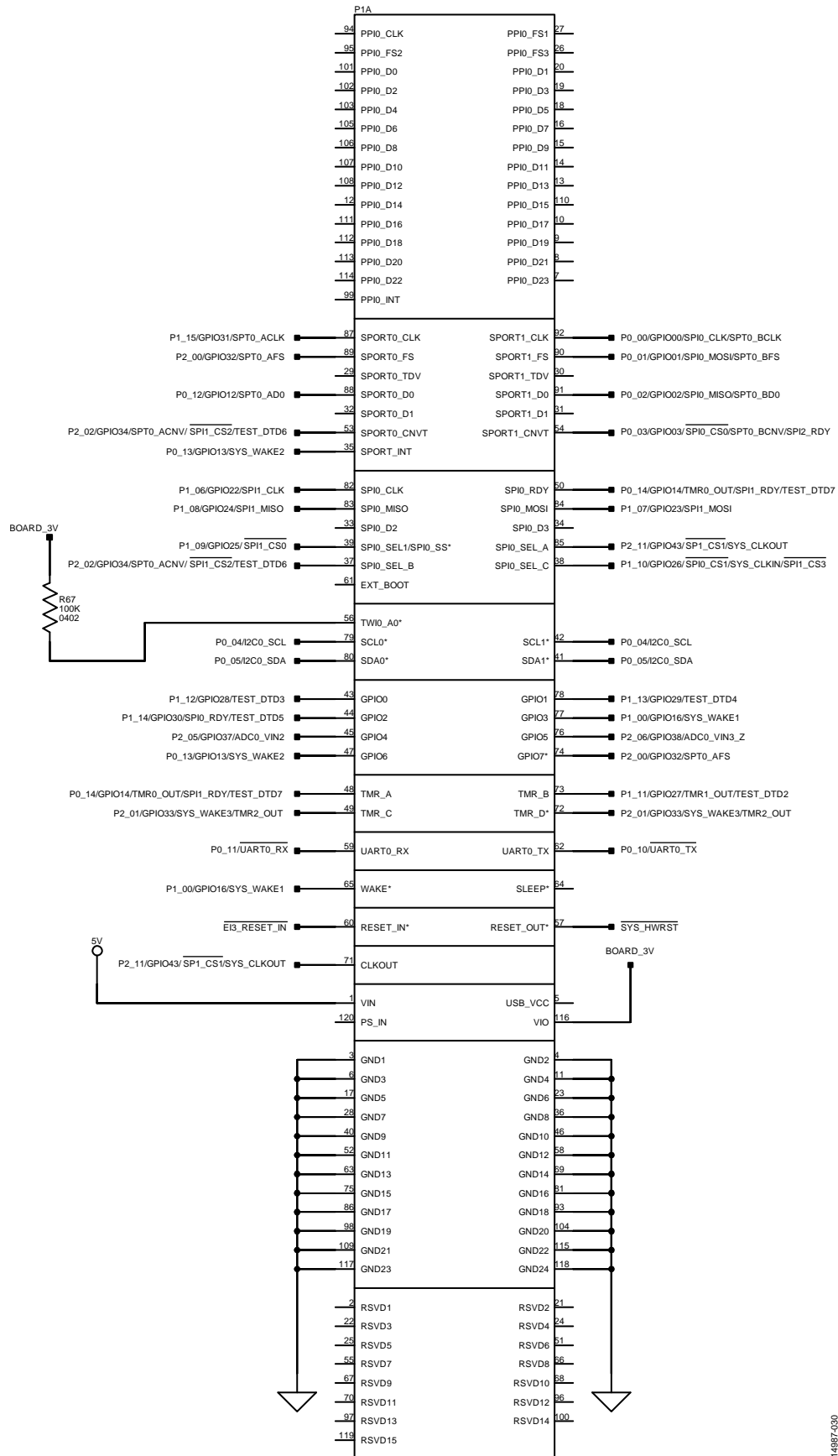|			
2	RSVD1	RSVD2	21
22	RSVD3	RSVD4	24
25	RSVD5	RSVD6	51
55	RSVD7	RSVD8	56
67	RSVD9	RSVD10	68
70	RSVD11	RSVD12	96
97	RSVD13	RSVD14	100
119	RSVD15		

14987-030

Figure 31. EI3 Schematic and Pin Diagram
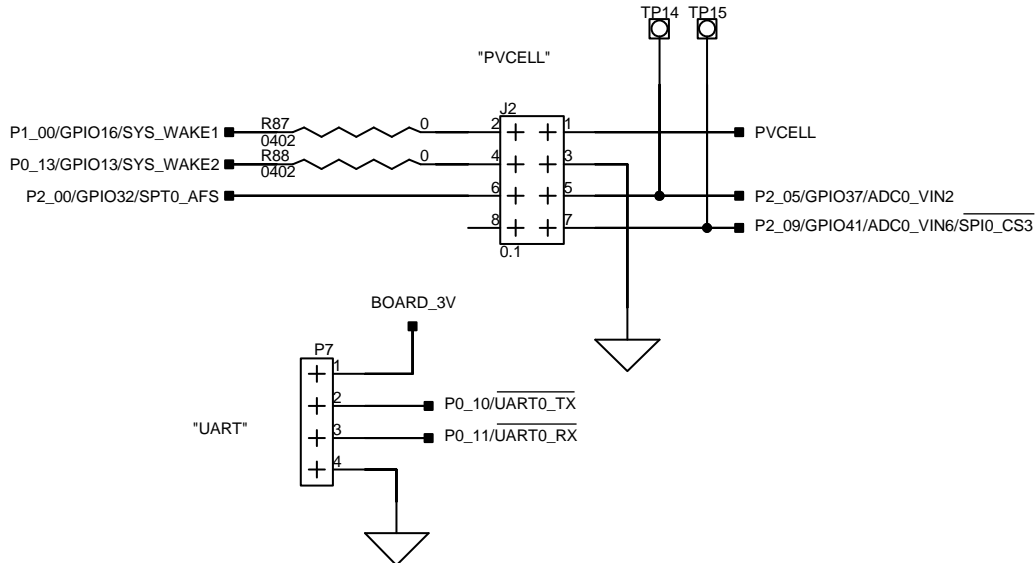
Figure 32. PV Cell Connector and UART (P7) Connector Schematic

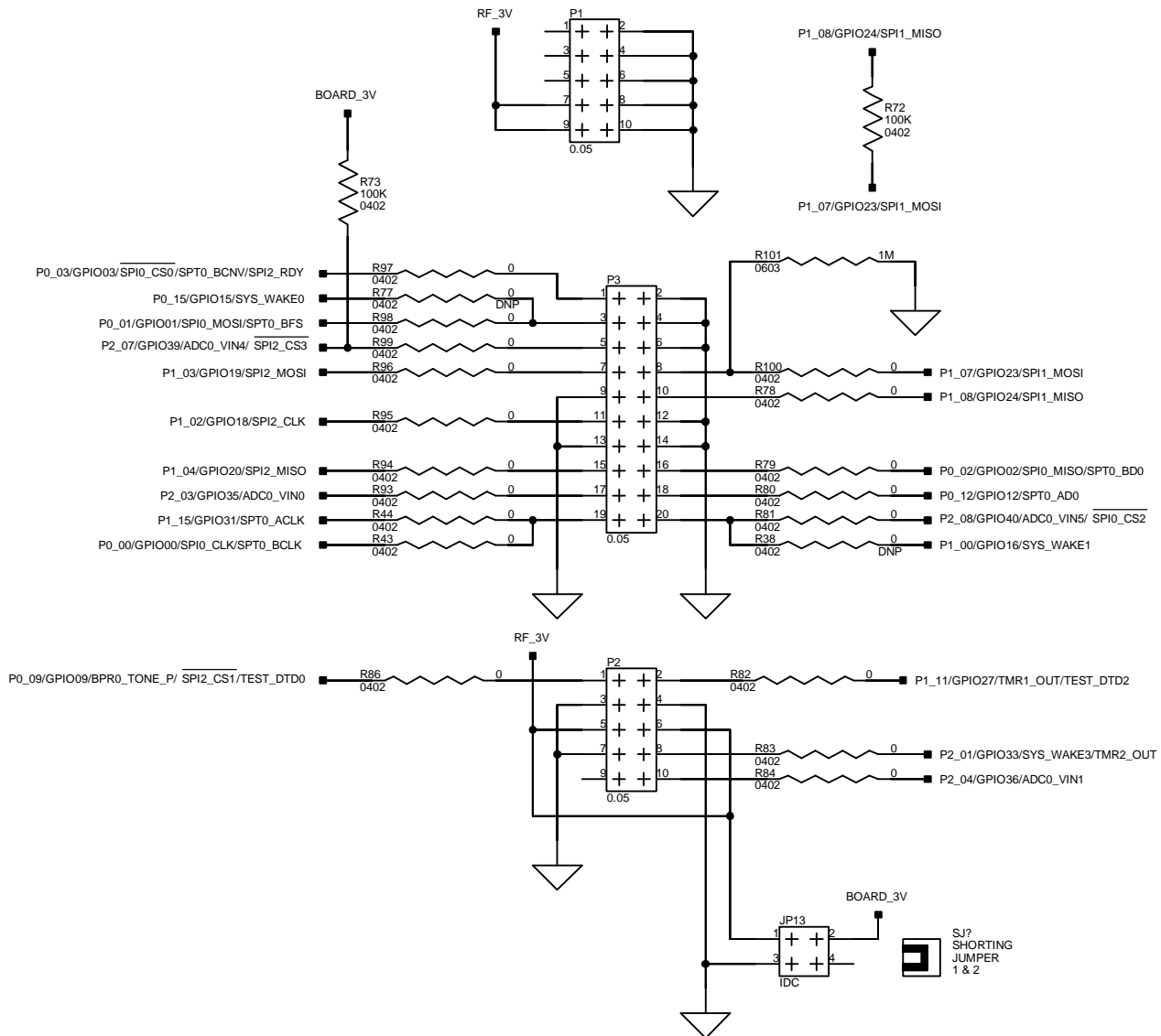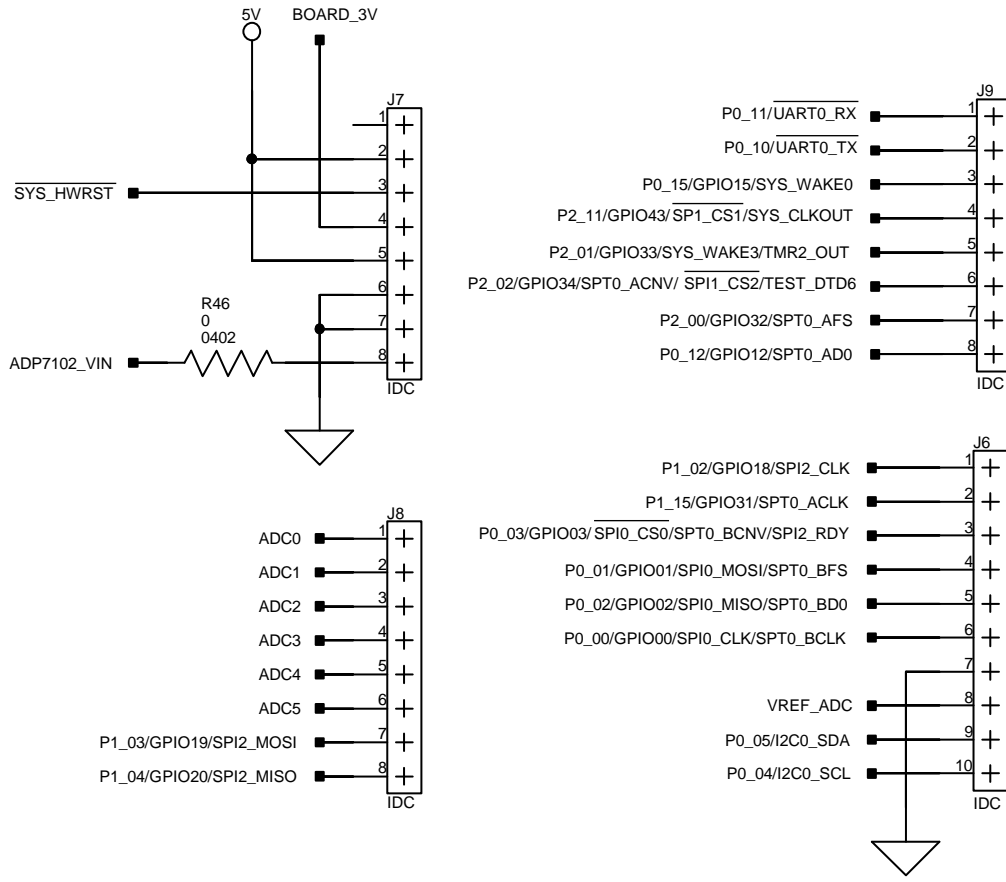Figure 33. Wireless Transceiver Interface Schematic

Figure 34. Arduino Headers Schematics

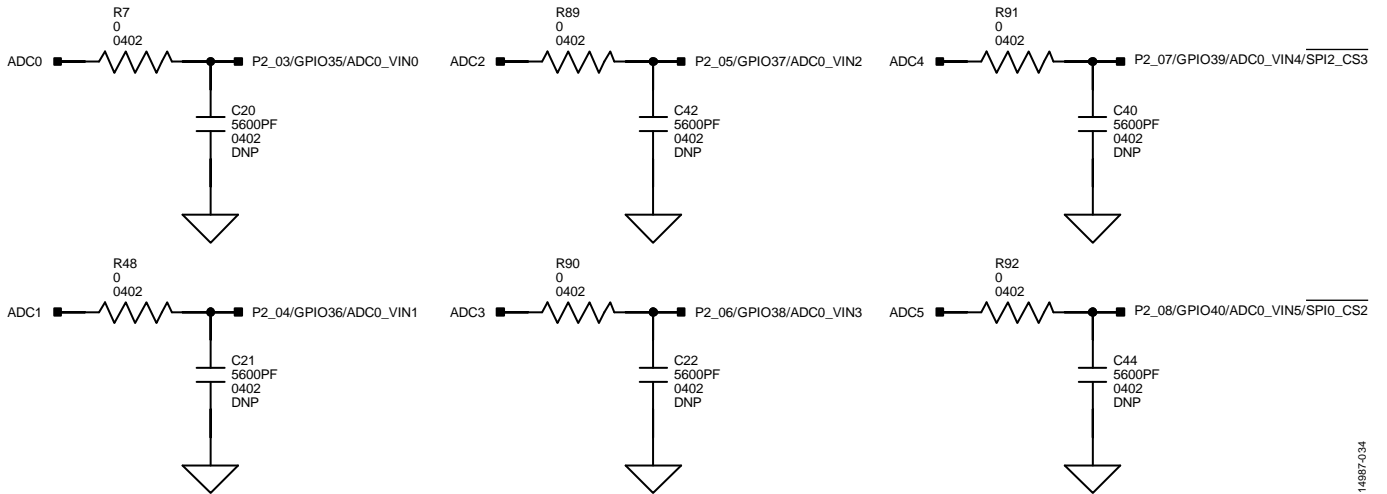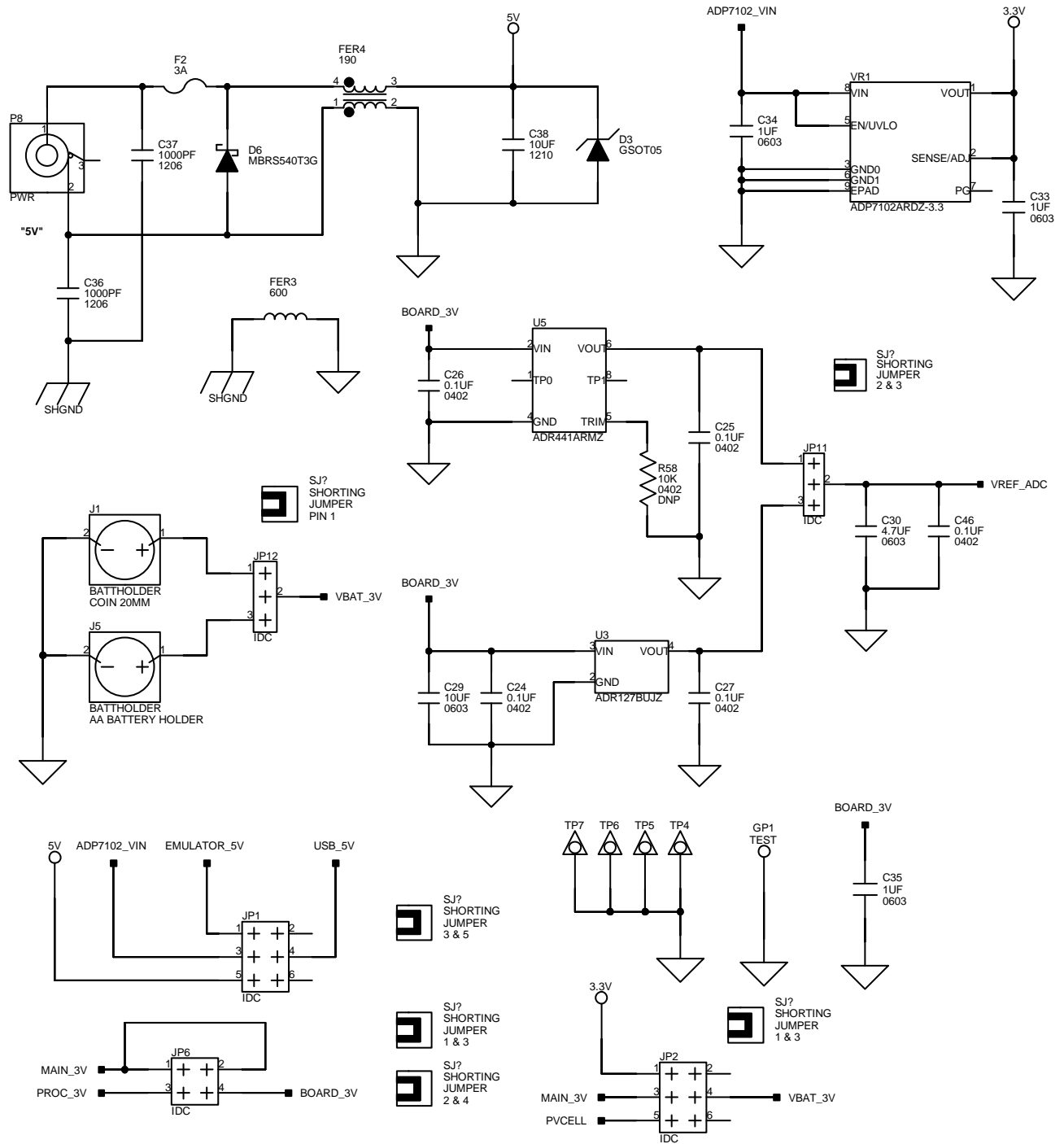*Figure 35. Arduino Analog Interface Schematic*

Figure 36. USB to UART Circuit Schematic

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	DigiKey	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	DigiKey	535-10298-2-ND
1	32.768 kHz SMT	Y1	EPSON	MC-306 32.768K-E3:ROHS
1	ADSP-ADuCM3029 64-lead QFN	U1	Analog Devices	ADuCM3029BCPZ-ENG
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	DigiKey	490-4683-2-ND
5	IDC 2X1 IDC 2 × 1	JP3 to JP5, JP8, JP9	Samtec	HTSW-102-07-T-S
2	IDC 3X1 IDC 3 × 1	JP11, JP12	Samtec	HTSW-103-07-T-S
3	IDC 8X1 IDC 8 × 1	J7 to J9	Samtec	SSW-108-01-TM-S
1	3A resetable FUS004	F2	TE Connectivity Ltd.	SMD300F-2
1	IDC 2-pin_JUMPER_SHORT	SJ	DigiKey	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 .65 mm CON045	P8	DigiKey	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	DigiKey	H11589CT-ND
2	0.05 5X2 SAMTEC_TFM-105-02-S-DA	P1, P2	Samtec	TFM-105-02-S-D-A
1	0.05 10X2 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	DigiKey	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	DigiKey	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	600 500 MA 1206	FER1 to FER3	LairdTech	HZ1206B601R-10
6	0 1/8 W 5 % 0805	R8, R13, R18 to R21	Vishay	CRCW08050000Z0EA
1	0 1/8 W 5 % 0805	R16	Vishay	CRCW08050000Z0EA
1	190 5 A FER002	FER4	Murata	DLW5BSN191SQ2
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
3	10 K 1/16 W 5 % 0402	R53, R65, R66	Vishay	CRCW040210K0FKED

Qty	Description	Reference Designator	Manufacturer	Part Number
1	10 K 1/16 W 5 % 0402	R58	Vishay	CRCW040210K0FKED
58	0 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 1/10 W 5 % 0402	R38, R77, R85	Panasonic	ERJ-2GE0R00X
1	1 μF 16 V 10 % 0603 X5R	C35	DigiKey	399-5090-2-ND
1	4.7 μF 6.3 V 20 % 0603 X5R	C16	AVX Corp.	06036D475MAT2A
2	1 M 1/10 W 5 % 0603	R45, R101	Vishay	CRCW06031M00JNEA
1	10 μF 16 V 10 % 1210 X5R	C38	AVX Corp.	1210YD106KAT2A
2	1000 pF 50 V 5 % 1206	C36, C37	AVX Corp.	12065A102JAT2A
1	5 A MBRS540T3G SMC	D6	ON Semiconductors	MBRS540T3G
15	100 K 1/16 W 5 % 0402	R26 to R30, R39, R40, R52, R59, R60, R67, R68, R72, R73, R76	DigiKey	541-100KJTR-ND
4	100 K 1/16 W 5 % 0402	R3, R5, R41, R42	DigiKey	541-100KJTR-ND
1	30A GSOT05 SOT23-3	D3	Vishay	GSOT05-E3-08
3	2.2 K 1/10 W 5 % 0402	R24, R25	Panasonic	ERJ-2GEJ222X
1	GREEN LED_0603	LED2	DigiKey	67-1549-2-ND
5	499.0 1/10 W 1 % 0402	R23, R61 to R64	Panasonic	ERJ-2RKF4990X
1	0.1 μF 16 V 10 % 0402 X7R	C46	DigiKey	587-1451-2-ND
1	15 KV ESD7004 DFN50P250X100-10N	D5	ON Semiconductors	ESD7004MUTAG
1	0.0 1/10 W 1 % 0603	R22	FEC	933-1662
1	RED LED_0603	LED1	DigiKey	475-2512-2-ND
3	YELLOW LED_0603	LED3 to LED5	DigiKey	475-2793-1-ND
2	10 μF 6.3 V 20 % 0603 X5R	C8, C29	DigiKey	490-3896-2-ND
2	0.1 μF 35 V 10 % 0402 X7R	C12, C19	DigiKey	445-6901-2-ND
1	15 KV ESDA5V3SC6 SOT95P280X145-6N	D4	DigiKey	497-6633-1-ND
1	200 MA BAS40DW SOT-363	D2	Diodes Inc.	BAS40DW-04-7-F
2	1 μF 10 V 10 % 0603 X7R	C33, C34	DigiKey	587-1242-2-ND
2	8 pF 16 V ±0.5 pF 0402 COG	C9, C10	AVX Corp.	0402YA8R0DAT2A
4	20 pF 16 V ±5 % 0402 COG	C1, C2, C7, C48	AVX Corp.	0402YA200JAT2A
2	0.47 μF 16 V 10 % 0402 JB	C3, C6	DigiKey	445-10942-2-ND
1	4.7 μF 10 V 10 % 0603 X6S	C30	DigiKey	490-10464-2-ND

NOTES

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