EVM430-FR6043 hardware guide

This guide is a reference to the different hardware configurations available with the MSP430FR6043 Ultrasonic Sensing Evaluation Module (EVM430-FR6043). These configurations include power, header configurations and pinouts, and communication interfaces.

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Trademarks

1 Power

The USB or an external power supply (for example, a battery or a bench supply) can supply power to the EVM430-FR6043. Jumper and switch configurations set the power source for the MSP430FR6043 microcontroller (MCU).

1.1 USB Power

To use USB as the power source, set the S5 (POW_SEL) switch to the middle position (ezFET) (see Figure 1).

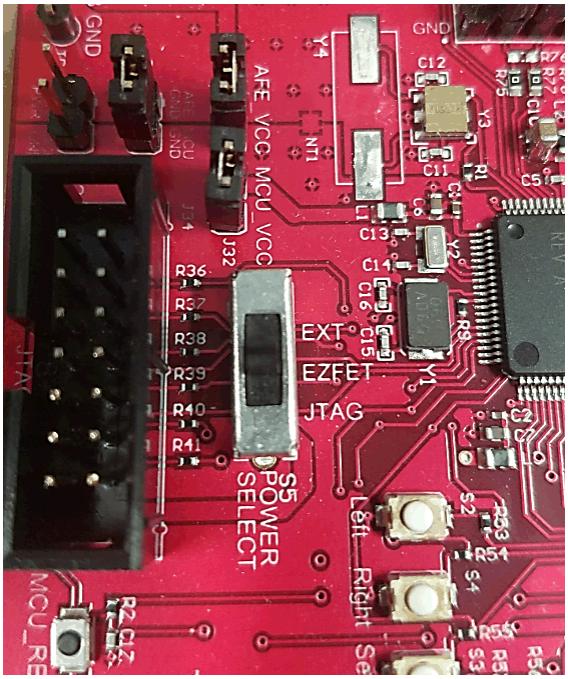

Figure 1. Power Selection

Figure 2 shows how to set J2 and J4.

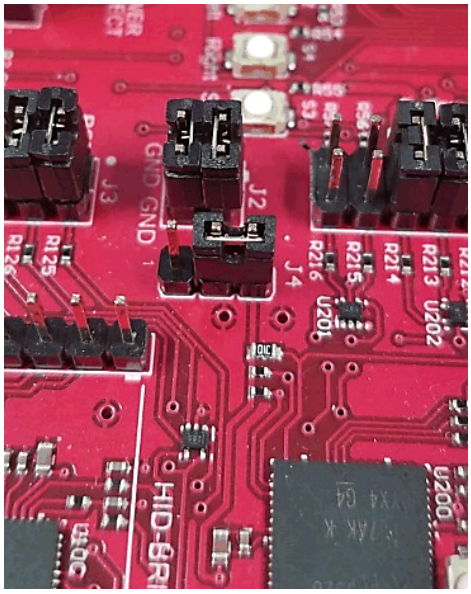

Figure 2. USB Power Jumper Configuration

1.2 External Power

When using external power, set the S5 switch to the top position (External). Apply the external supply voltage to the J33 header (see Figure 3). For lowest power consumption, open all jumpers on J1, J2, and J3. If the circuit does not use a regulator (which is optional), the operational supply voltage range is 1.8 V to 3.6 V. If communicating through USB, set GND on J2 and the communication jumpers on J1.

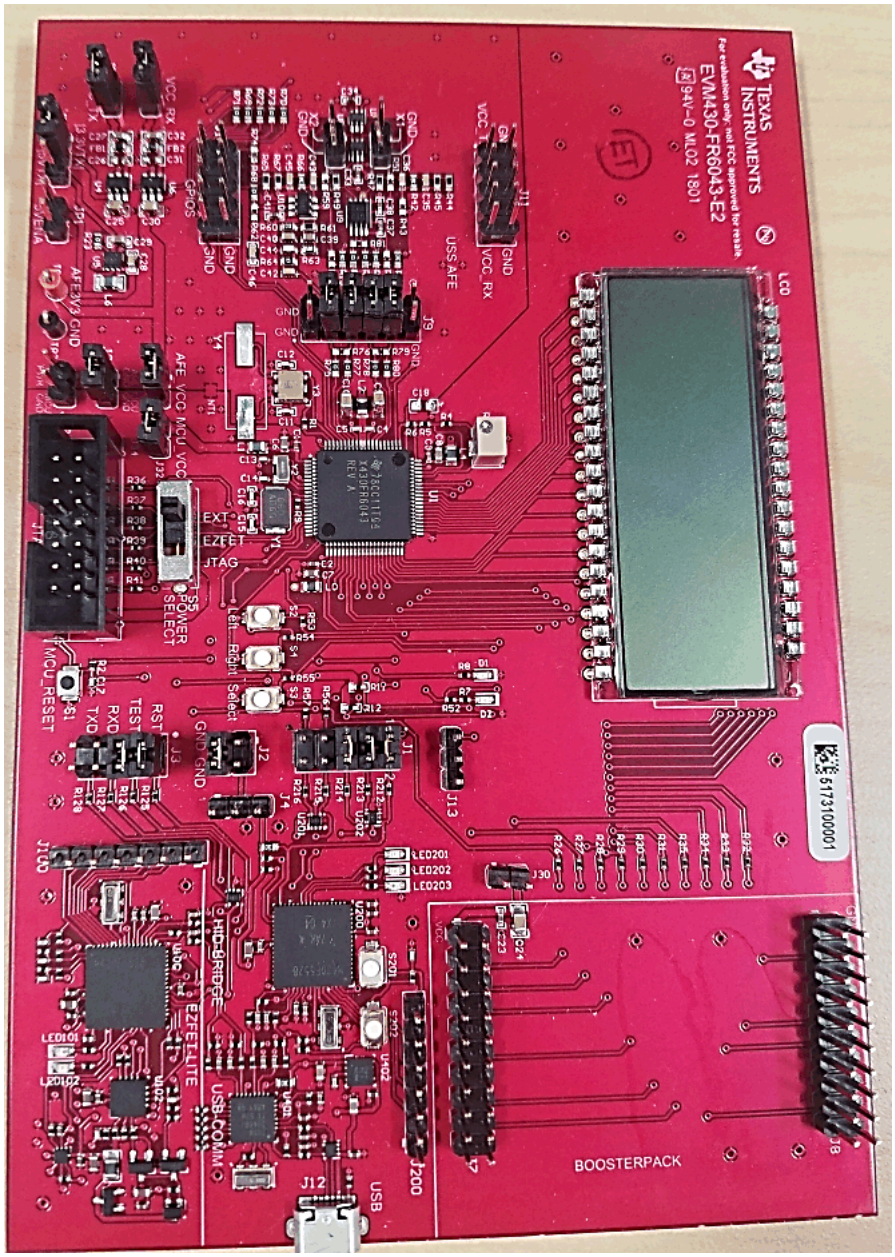

Figure 3. External Power

1.2.1 Measuring Current Consumption

To measure current consumption, remove the J32 jumper and place an ammeter across the header (see Figure 4). When current measurements are not being performed, make sure to set this jumper.

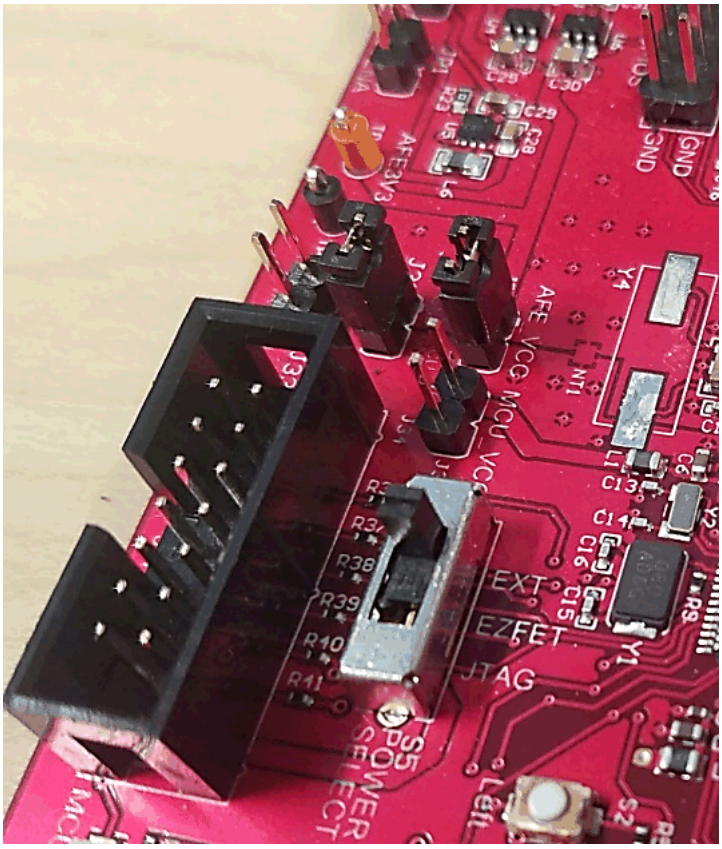

Figure 4. Current Measurement Header

2 Header Connections

2.1 Default Configuration

Table 1 lists the default jumper configuration.

Table 1. Default Jumper Configuration

Jumper	Default Configuration	Description
J1	1-2: ON 3-4: ON 5-6: ON 7-8: OFF 9-10: OFF	Allows communication to the Design Center using I^2C
J2	1-2: ON3-4: ON	Provides power to the EVM from USB
J3	1-2: ON 3-4: ON 5-6: OFF 7-8: OFF	Allows programming and debugging using the integrated eZ-FET. Disables the backchannel UART.
J4	2-3: ON	Uses the USB LDO to provide power to the EVM
J5	Transducer 1	Connects to transducer 1
J6	Transducer 2	Connects to transducer 2
J9	1-2: OFF 3-4: ON 5-6: ON 7-8: O N9-10: OFF	Connects transducer signals to the analog front end (AFE)
J10	OFF	Provides access to the AFE pins
J11	OFF	Provides access to the AFE pins
J13	OFF	Provides access to the MTIF pins
J30	OFF	Disconnects V_{CC} from the expansion connector
J31	ON	Connects AFE ground to MCU ground
J32	ON	Provides power to the MCU
J33	OFF	Provides external power. Not used when powered through USB.
JP1	OFF	Provides 5-V power to the AFE circuitry. Can be used for power measurement.
JP2	3.3VTX	Enables the 3.3-V AFE circuitry
JP3	ON	Provides power to the AFE. Can be used for power measurement.
JP4	ON	Provides power to the AFE transmit circuitry. Can be used for power measurement.
JP5	ON	Provides power to the AFE receive circuitry. Can be used for power measurement.

2.2 Transducer Headers

You can connect two transducers to the board on J5 and J6. The PCB silkscreen shows signal (X1 or X2) and ground (GND) for each transducer.

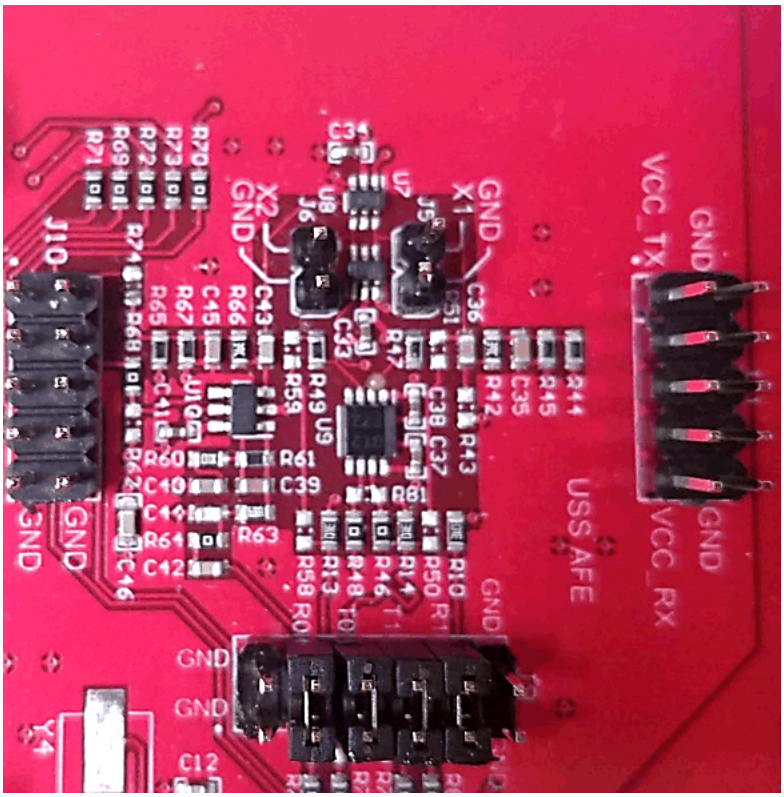

Figure 5. Transducer Header

2.3 Connectors for BoosterPack Plug-in Modules

You can connect a BoosterPack™ plug-in module or other device that offer functionality such as wireless connectivity on J7 and J8. To power a BoosterPack plug-in module from the main power supply, set J30 (see Figure 6 and Table 2).

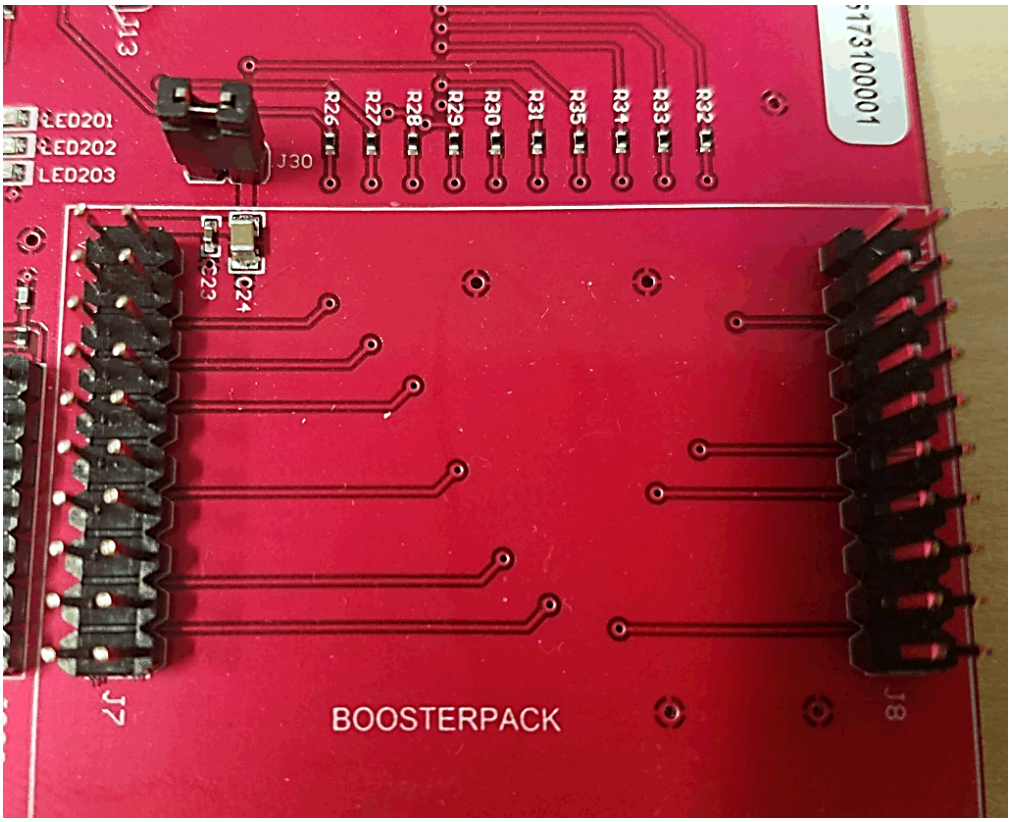

Figure 6. Headers for BoosterPack Plug-in Modules

Table 2. Connections for BoosterPack Plug-in Modules

J7		J8	
VCC	N.C.	N.C.	GND
N.C.	GND	N.C.	N.C.
RXD	N.C.	N.C.	SPI_CS
TXD	N.C.	N.C.	N.C.
GPIO	N.C.	N.C.	N.C.
N.C.	N.C.	N.C.	SPI_MOSI
SPI_CLK	N.C.	N.C.	SPI_MISO
N.C.	N.C.	N.C.	N.C.
SCL	N.C.	N.C.	N.C.
SDA	N.C.	N.C.	GPIO

2.4 JTAG

A standard MSP430 14-pin JTAG header supports communication to program and debug the MCU (see Figure 7). If power is supplied by the JTAG header, set the POW_SEL switch the bottom position (JTAG). If external power is used, set the switch to the top position (External).

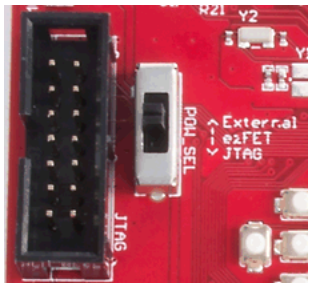

Figure 7. JTAG Header

2.5 Communications

The EVM430-FR6043 supports UART, I^2C, and Spy-Bi-Wire interfaces.

J3 connects JTAG TX and RX (UART). To use this interface with the on-board eZ-FET circuit, place jumpers on the J3 TXD and RXD pins (see Figure 8).

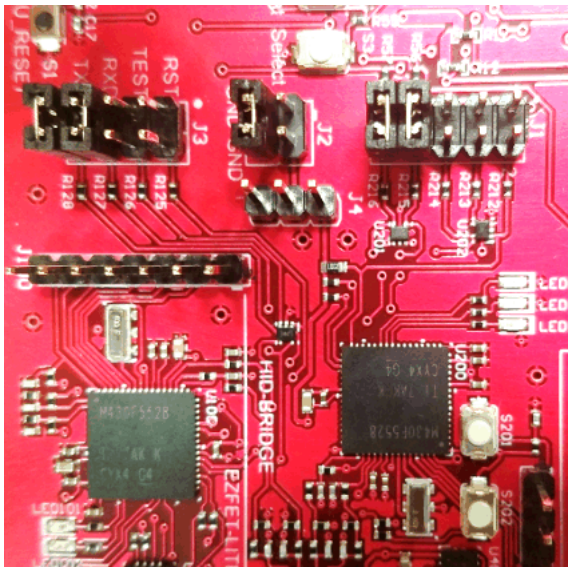

Figure 8. JTAG UART Jumpers

J2 also provides a connection for the Spy-Bi-Wire interface to program and debug the MCU. To use the on-board eZ-FET circuit, place jumpers on the J3 TEST and RST pins (see Figure 9).

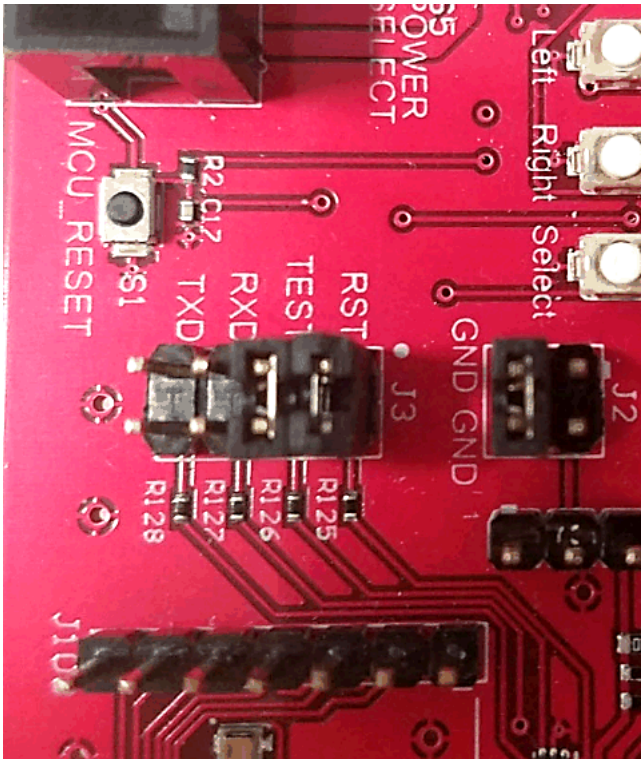

Figure 9. Spy-Bi-Wire Jumpers

J1 provides a connection between the MSP430FR6043 MCU and the high-speed USB HID interface. To enable I²C, put jumpers on the J1 COMM_SDA, COMM_SCL, and COMM_IRQ pins (see Figure 10).

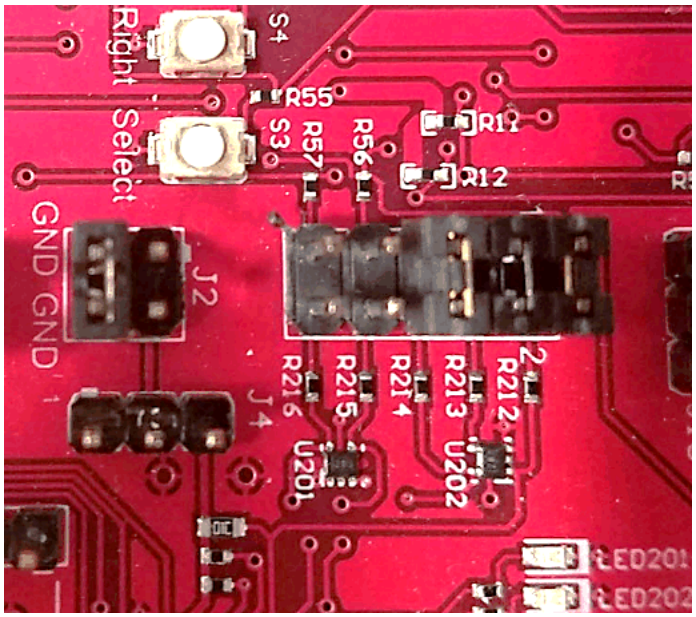

Figure 10. I²C Jumpers

To enable UART on the USB HID interface, put jumpers on the J1 TXD and RXD pins (see Figure 11).

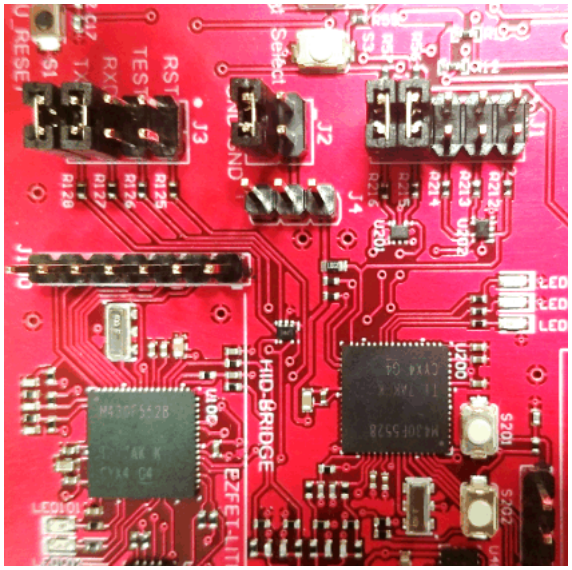

Figure 11. USB HID UART Jumpers

3 LCD

Adjust the LCD contrast with the R3 potentiometer (see Figure 12). Use a small flathead screwdriver to adjust the resistance of R3 and monitor the contrast on the display.

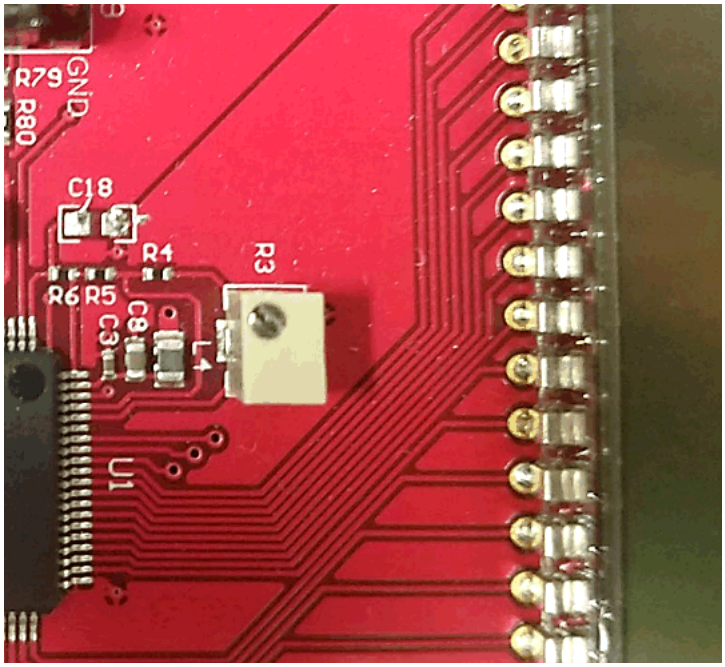

Figure 12. LCD Contrast Control

4 AFE Configuration

The EVM430-FR6043 includes circuitry for additional amplification and to filter. The following sections describe how to configure this AFE.

4.1 Power Source

To use the same voltage source as the MCU, set JP3. To use an external voltage source, remove the jumper from JP3 and apply voltage to TP1 (V+) and TP2 (GND) (see Figure 13).

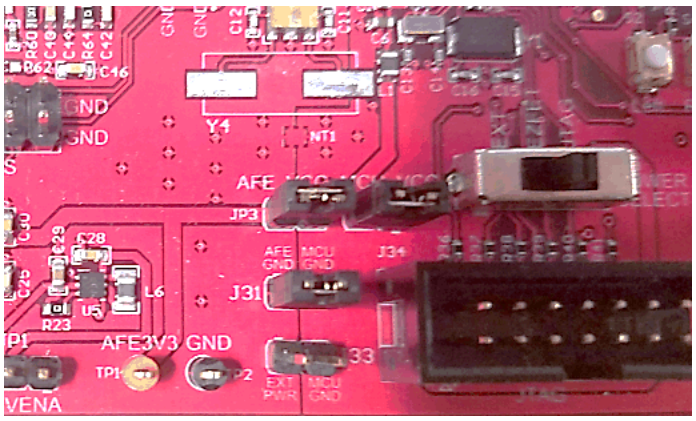

Figure 13. MCU Voltage Source

4.2 TX Voltage

Use JP2 to set the transmit voltage level to 3.3 V or 5 V. For 5-V operation, also set JP1 (see Figure 14).

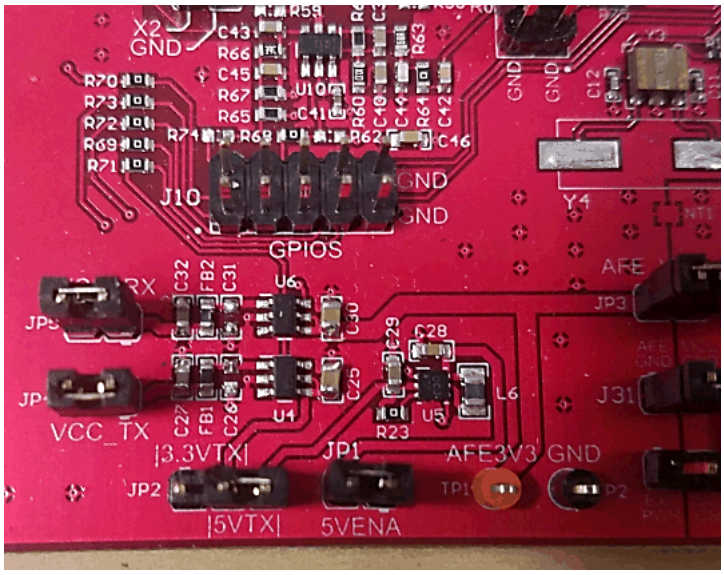

Figure 14. 5-V Configuration

4.3 5-V Enable

The AFE includes a DC/DC step-up converter to enable 5-V TX voltage. To enable the step up converter, set JP1. For 5-V operation, also set JP2 for 5-V operation (see Figure 14).

5 References

1. MSP430FR6043-based ultrasonic gas flow meter quick start guide
2. MSP430FR604x, MSP430FR504x ultrasonic sensing MSP430™ microcontrollers for gas and water flow metering applications data sheet

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