MSP430AFE253 Development Board

(CL-MSPDB-AFE)

User Guide

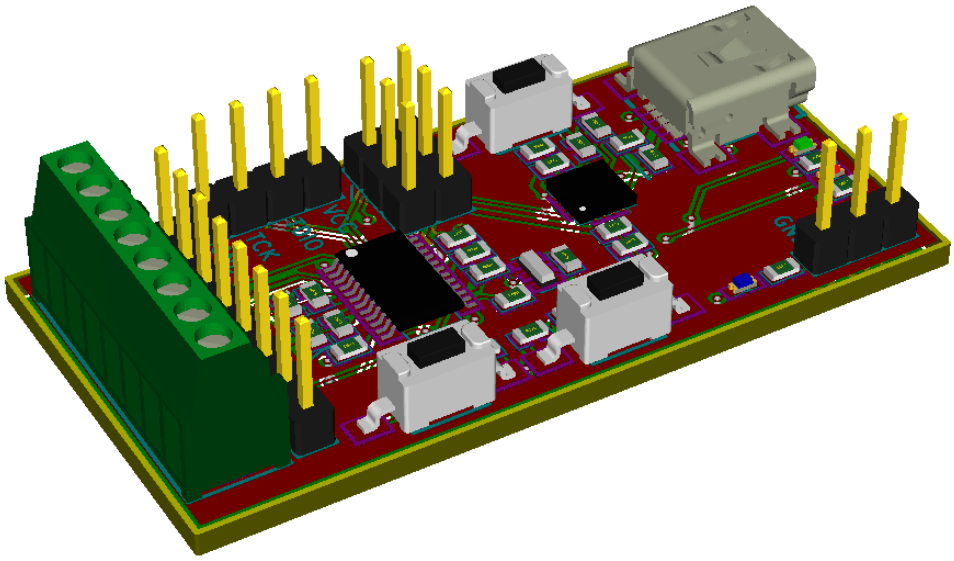


Table of Contents

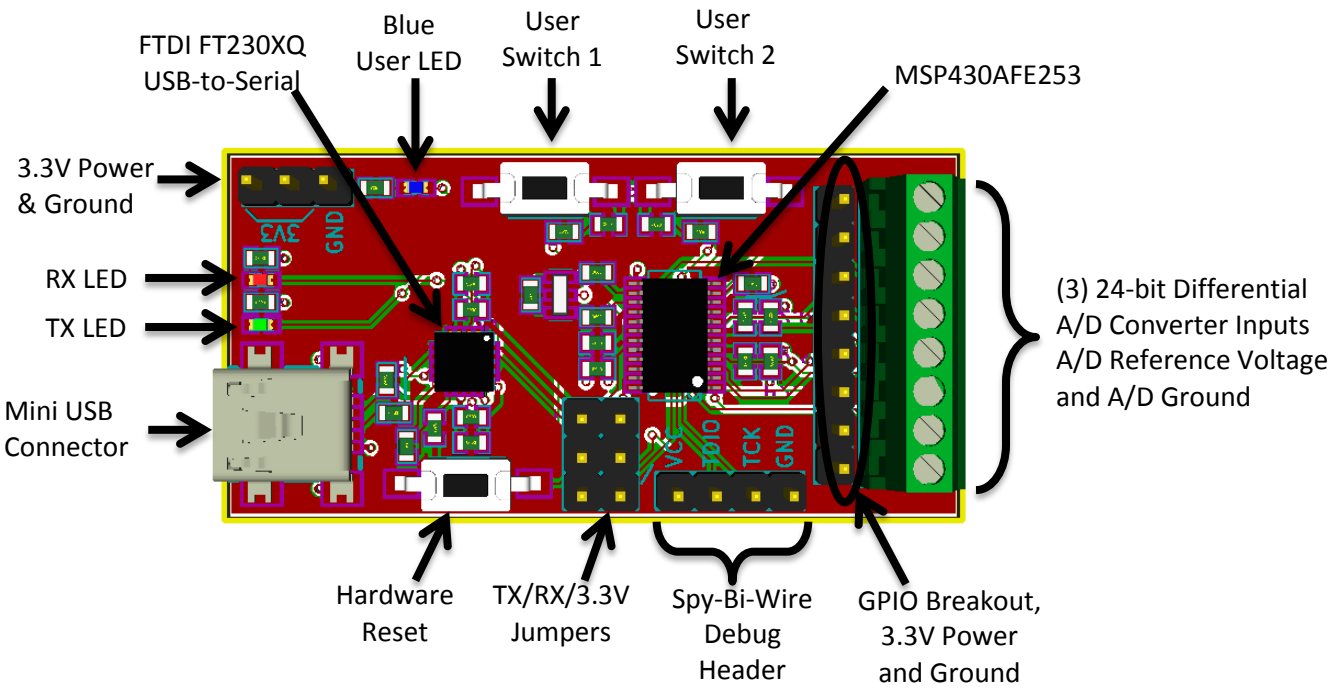
1 Revision History

Date	Revision	Change
2014-Aug-14	1.0	First Release
2014-Aug-23	1.1	Updated PCB layout images and schematic per hardware rev 4
2014-Aug-26	1.2	Updated BOM
2014-Sep-16	1.3	Updated schematic and PCB drawings

2 Features

- Texas Instruments MSP430AFE253 with 2kB Flash and 512 bytes of RAM, plus 24-bit A/D
- 8MHz Ceramic Resonator
- 8-position 100-mil pitch screw terminal block for 3 differential analog inputs, V_{ref} and ground
- 8-position 100-mil pitch male pin header for easy access to 6 GPIO pins, power and ground
- Mini USB connector supplies 5V power and access to virtual com port for serial
- On-board USB-to-serial converter IC for easy serial port communication and 3.3V supply
- 1 pushbutton for hardware reset of the MSP430 MCU
- 2 pushbuttons for user input
- Texas Instruments' Spy-Bi-Wire debug interface via 4-pin 100-mil pitch male pin header
- Blue LED for application-defined visual feedback
- RX and TX LED's for visual feedback of USB-to-serial converter communication activity
- 1x3 x 100-mil pitch male pin header for external 3.3V power input and ground
- 2 removable jumpers for isolating the RX/TX lines from the USB-to-serial converter IC
- USB-to-serial converter can be completely removed from the circuit via 3 removable jumpers; one for UART RX, one for UART TX and one for the 3.3V supply. Allows verification of ultra-low power consumption features of your application on the MSP430. Alternatively, provides easy connection of other TTL UART hardware, such as GPS, Bluetooth modules, etc.

3 Board Features



3.1 Mini USB Connector

The mini USB connector (J1) provides a serial interface via the FTDI FT230XQ USB-to-Serial converter IC. Additionally this chip provides the 3.3V regulated supply from the 5V supplied by the USB port.

The UART RX and TX lines from the FT230XQ go directly to the MSP430AFE253 through removable jumpers. This allows a means of disconnecting the FT230XQ chip from the MSP430AFE253 UART in case other UART hardware needs to be connected (i.e. UART display, GPS chip, etc). These jumpers are labeled in the silkscreen on the back of the MSP430AFE253 Development Board.

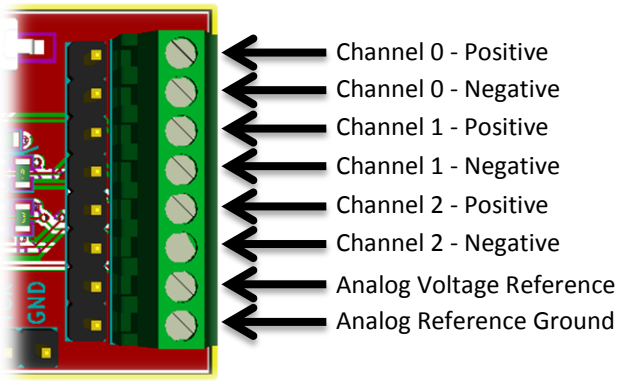
The regulated 3.3V power from the FT230XQ can also be disconnected via jumper (P2). This allows a means of using an alternate power supply without back feeding into the FT230XQ chip. This is especially important when trying to achieve the lowest possible power consumption (i.e. battery-powered applications, etc.). This jumper is labeled in the silkscreen on the back of the MSP430AFE253 Development Board.

3.2 External Power Connector

The external power connector (P1) is a 100-mil pitch male pin header and provides a means of connecting a battery or other external power source. There are two pins provided for 3.3V and one pin for Ground, as some battery connectors skip a position between the positive and negative terminals.

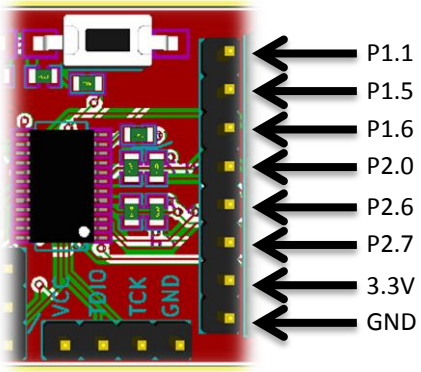
3.3 Analog Connections

The 8-postion screw terminal block (TB1) offers an easy method of connecting external analog sensors, such as current transformers, voltage taps, temperature sensors, pressure sensors, strain gauges and other high-sensitivity wheatstone bridge outputs to the 24-bit analog-to-digital front end. The terminal block pinout is as follows:



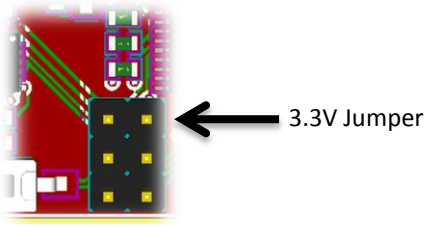
3.4 GPIO Header

The GPIO header (P) provides a means of utilizing other GPIO pins or other unused peripherals on the MSP430AFE253. Refer to the MSP430AFE253 datasheet and family user guide for GPIO pin functionality and peripheral availability.



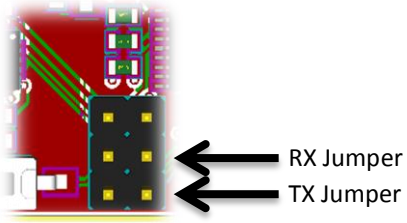
3.5 3.3V Jumper

The 3.3V jumper (P2) provides a means of disconnecting the regulated 3.3V supply output from the FT230XQ. This allows use of an alternate power supply without back feeding into the FT230XQ chip. This is especially important when trying to achieve the lowest possible power consumption (i.e. battery-powered applications, etc.). This jumper is labeled in the silkscreen on the back of the MSP430AFE253 Development Board.



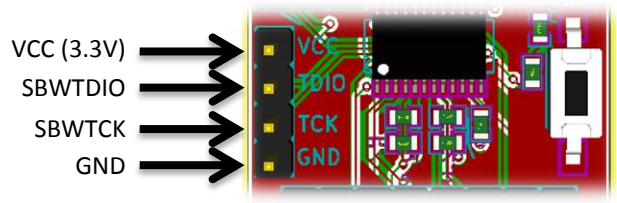
3.6 TX & RX Jumper

The RX and TX jumpers (P4 and P5 respectively) provide a means of disconnecting the FT230XQ UART lines in case other UART hardware needs to be connected (i.e. UART display, GPS chip, etc). This is especially important when trying to achieve the lowest possible power consumption (i.e. battery-powered applications, etc.). These jumpers are labeled in the silkscreen on the back of the MSP430AFE253 Development Board.



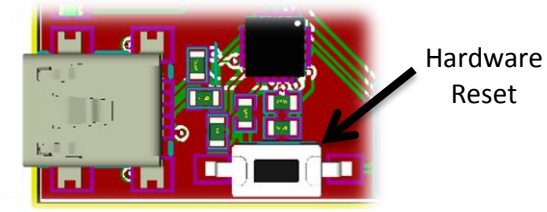
3.7 Spy-by-Wire Debug Header

The Spy-by-Wire Debug Header (P3) provides a means of connecting a debugger (e.g. MSP-FET430UIF) for program load and debug.



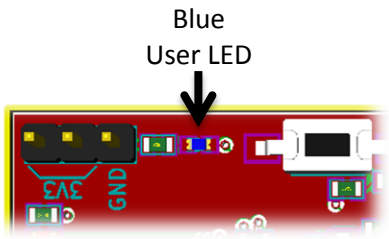
3.8 Reset Pushbutton

The reset pushbutton (SW3) provides ready access the MSP430AFE253 Reset pin. Pressing this will give a hard reset to the MSP430AFE253.



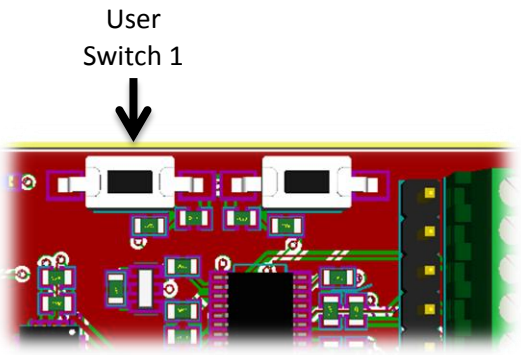
3.9 Blue User LED

The blue user led (D3) is connected to P1.7 and is available as an application-defined method of visual feedback.



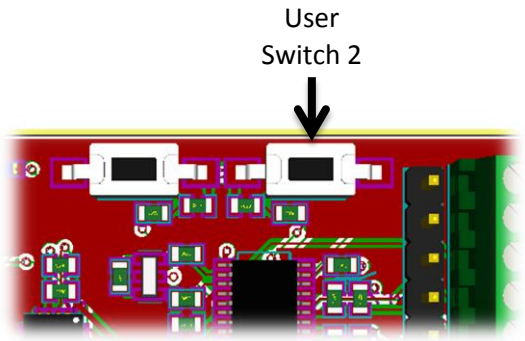
3.10 User Switch 1

User switch 1 (SW1) is connected to P1.2 and is available as an application-defined method of tactile user input.



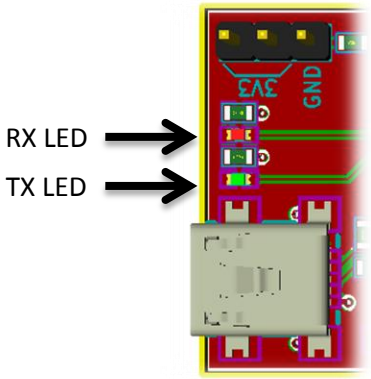
3.11 User Switch 2

User switch 2 (SW2) is connected to P1.0 and is available as an application-defined method of tactile user input.

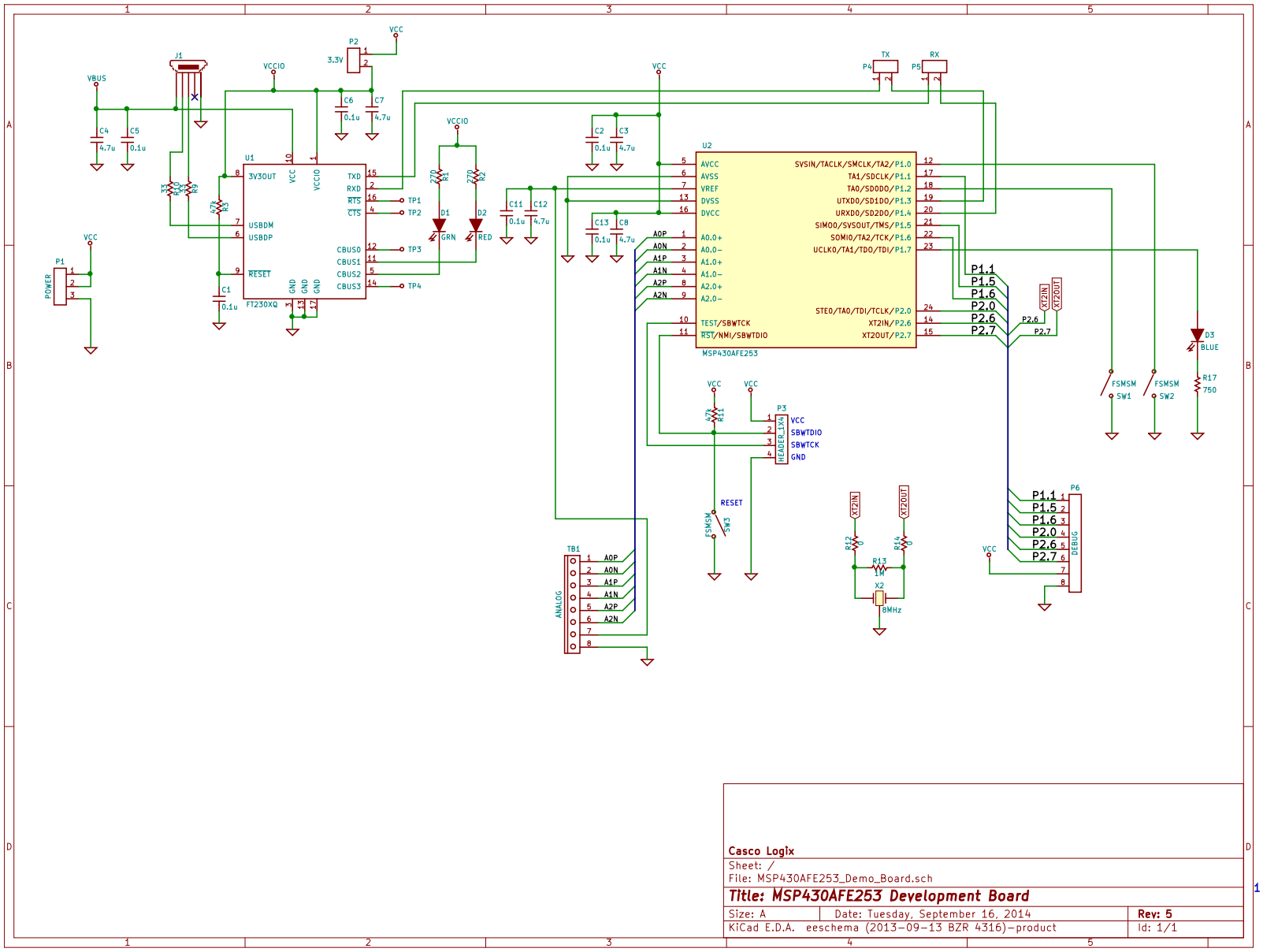


3.12 UART RX & TX LED

A green UART TX LED (D1) and red UART RX LED (D2) has been provided to indicate serial data communication activity. Using the FTDI factory default memory configuration of the FT230XQ, the green LED (D1), connected to the CBUS2 pin, blinks whenever serial data is being transmitted over USB from the board. Using the FTDI factory default memory configuration of the FT230XQ, the red LED (D2), connected to the CBUS1 pin, blinks whenever serial data is being received over USB to the board.



4 Schematic


Casco Logix
Sheet: /
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Title: MSP430AFE253 Development Board
Size: A
Date: Tuesday, September 16, 2014
Rev: 5
KiCad E.D.A. eeschema (2013-09-13 BZR 4316)-product
Id: 1/1
MSP430AFE253
FT230XQ
3V3OUT
USBDM
USBDP
RESET
TXD
RXD
RTS
CTS
CBUS0
CBUS1
CBUS2
CBUS3
AVCC
AVSS
VREF
DVSS
DVCC
TEST/SBWTCK
RST/NMI/SBWTDIO
SVSIN/TACLK/SMCLK/TA2/P1.0
TA1/SDCLK/P1.1
TA0/SDODO/P1.2
UTXD0/SD1DO/P1.3
URXD0/SD2DO/P1.4
SIMO0/SVSOUT/TMS/P1.5
SOMI0/TA2/TCK/P1.6
UCLK0/TA1/TDO/TDI/P1.7
STE0/TA0/TDI/TCLK/P2.0
XT2IN/P2.6
XT2OUT/P2.7
A0P
A0N
A1P
A1N
A2P
A2N
VBUS
VCC
VCCIO
3.3V
GND
POWER
ANALOG
DEBUG
HEADER_3X4
FSMSM
BLUE
GRN
RED
TX
RX
RESET
8MHz

5 PCB Layers

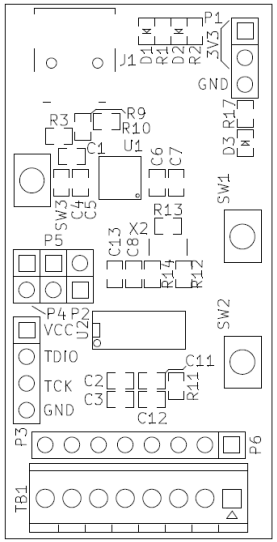

Figure 1: Top Silkscreen

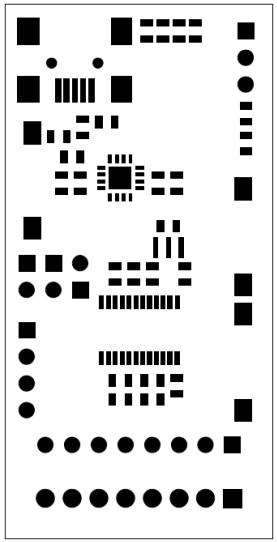

Figure 2: Top Soldermask

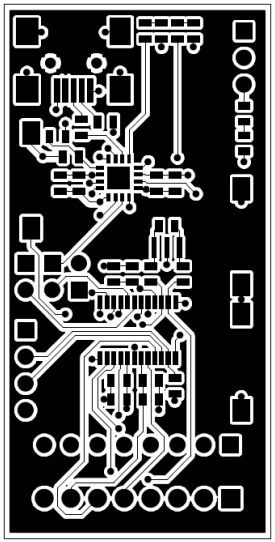

Figure 3: Top Copper

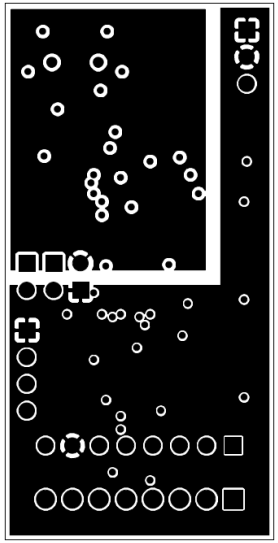

Figure 4: Inner 1

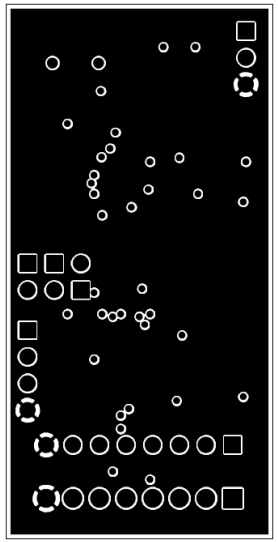

Figure 5: Inner 2

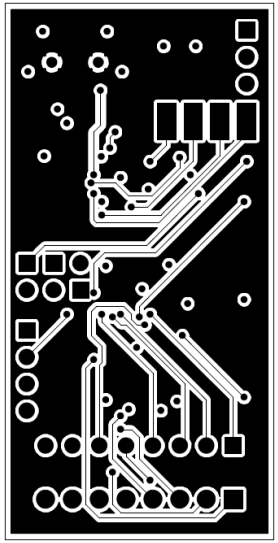

Figure 6: Bottom

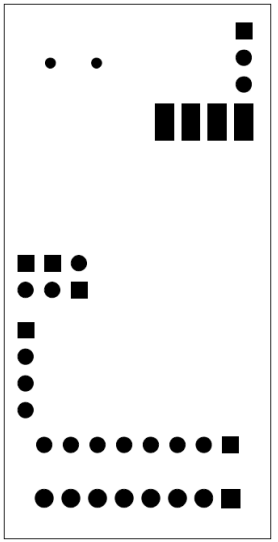

Figure 7: Bottom Soldermask

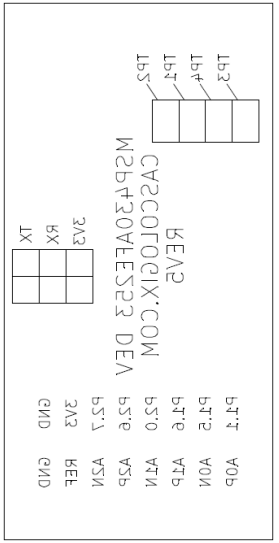

Figure 8: Bottom Silkscreen

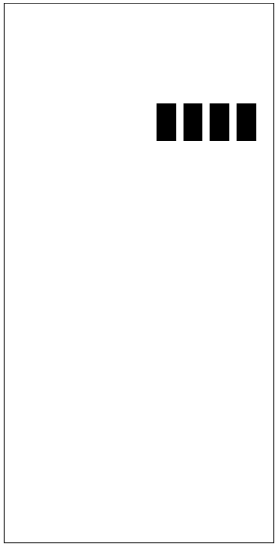

Figure 9: Bottom Pastemask

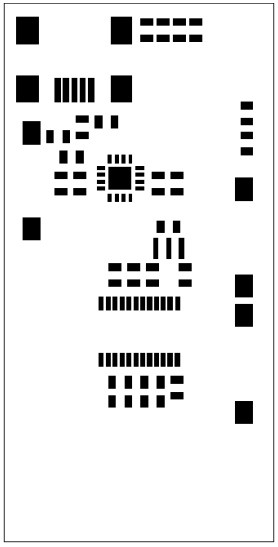

Figure 10: Top Pastemask

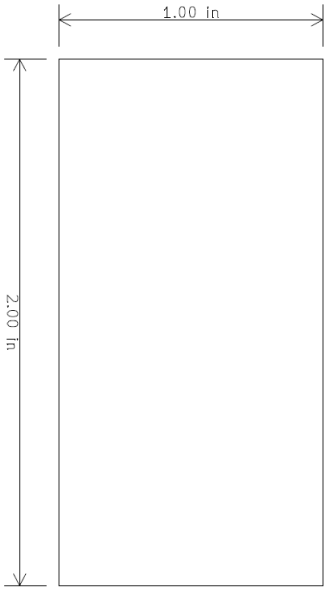

Figure 11: Outline

6 Bill of Materials

BOM Item	Mfg	Mfg Part#	Description	Ref Des	Pkg Size	Qty
1	Kemet	C0603C104K8RACTU	CAP CER 0.1UF 10V 10% X7R 0603	C13,C11,C6,C5,C1,C2	0603	6
2	Samsung Electro-Mechanics America, Inc	CL10B475KQ8NQNC	CAP CER 4.7UF 6.3V 10% X7R 0603	C3,C4,C7,C8,C12	0603	5
3	OSRAM Opto Semiconductors Inc	LG L29K-G2J1-24-Z	LED SMARTLED GREEN 570NM 0603	D1	0603	1
4	OSRAM Opto Semiconductors Inc	LS L29K-G1J2-1-Z	LED SMARTLED 630NM RED 0603 SMD	D2	0603	1
5	OSRAM Opto Semiconductors Inc	LB Q39G-L2N2-35-1	LED CHIPLED BLUE 470NM 0603 SMD	D3	0603	1
6	On Shore Technology Inc	USB-M26FTR	CONN USB MINI B R/A SMD	J1		1
7	Sullins	PEC36SAAN	CONN HEADER 36PS .100 SINGLE PTH	P1,P3,P6		1
8	Stackpole Electronics Inc	RMCF0603JT270R	RES 270 OHM 1/10W 5% 0603	R1,R2	0603	2
9	Stackpole Electronics Inc	RMCF0603JT1M00	RES 1M OHM 1/10W 5% 0603 SMD	R13	0603	1
10	Stackpole Electronics Inc	RMCF0603JT47K0	RES 47K OHM 1/10W 5% 0603 SMD	R3,R11	0603	2
11	Stackpole Electronics Inc	RMCF0603JT750R	RES 750 OHM 1/10W 5% 0603 SMD	R17	0603	1
12	Panasonic Electronic Components	ERJ-3GEY0R00V	RES 0.0 OHM 1/10W 0603 SMD	R14,R12	0603	2
13	Stackpole Electronics Inc	RMCF0603JT33R0	RES 33 OHM 1/10W 5% 0603 SMD	R9,R10	0603	2
14	TE Connectivity	FSMSM	SWITCH TACTILE SPST-NO 0.05A 12V	SW1,SW3,SW2		3
15	On Shore Technology Inc	OSTVN08A150	CONN TERM BLOCK 2.54MM 8POS PCB	TB1		1
16	FTDI	FT230XQ-R	USB TO SERIAL BRIDGE	U1	QFN16	1
17	Texas Instruments	MSP430AFE253IPW	IC MCU 16BIT 16KB FLASH 24TSSOP	U2	SSOP24	1
18	Murata Electronics North America	CSTCE8M00G55-R0	CER RESONATOR 8.00MHZ SMD	X2		1
19	3M	969102-0000-DA	SHUNT JUMPER .1" BLACK GOLD	N/A		3
20	FCI	67997-472HLF	CONN HEADER 72POS .100 DUAL TIN	P2,P4,P5		1