smWSP-ARD

Wireless Sensor Rapid Design Platform: Arduino/nRF52 DK Compatible

Features

- Arduino/nRF52 DK Compatible
- Rapid Prototype: 4 I2C smBLOCKS, 1 SPI smBLOCK
- Supports up to 5 sensors, or 4 sensors + 1 Serial Flash
- 1 smCOM BLOCK for USB-UART support
- DIP Switch to enabled individual Interrupt pins for each smBLOCK
- DIP Switch connect SPI pins to smBLOCK SPI
- Compatible with all smMEM, smSENSR, smMOTN, smCOM, smPWR, and smRF-nRF52 plugins
- 99.1x63.5mm(3.9x2.5”)
- **Adesto Driver Example Software Available**
- **COMING SOON!! smWARE-LOGR Software**
- 1.25mm Battery connector
- CR2032 Coin Cell Holder(bottom of PCB)
- smPWR-MP2148 DC/DC converter plugin for 3.3V/1.8V regulation from LiPO
- Can be used as a nRF52/Arduino Shield to Rapid Prototype Sensor applications
- smRF-LR832(nRF52 +21dBm Long Range Module) development platform. Other smRF options.
- smRF-LR832 can be programmed via nRF52 DK or external J-LINK via SWD Connector.
- Growing family of plugins Sensors(smSENSR), Power(smPWR), Battery(smBAT), Motion Sensors(smMOTN), USB-UART(smCOM), and RF Radios(smRF) and smWARE software to tie everything together.

Applications

- IoT Sensors
- DataLogging
- Low Power Battery Applications
- Wearables
- BLE Beacon Sensors
- Industrial Sensing
- Energy Harvesting Applications
- Set-top boxes: TV, gaming, remote controllers

Contents

Sensor Maestros Wireless Sensor Development Kits

Sensor Maestros is the inventor of the concept of providing a pluggable wireless sensor development kit. The concept came about because of a need to have a platform that could be used to rapidly develop wireless sensor applications for custom developed products and to be able to choose the 'Sensors that Make Sense'. 'Sensors that Make Sense' has become the driving motto of the Sensor Maestros team.

The smWSP-ARD(Arduino Rev 3 compatible) and the smWSP/smRF-WB provide the capability to plug in any of the Sensor Maestros ***smMEM***, ***smSENSR***, ***smMOTN***, ***smCOM***, ***smBAT***, and ***smPWR*** breakout boards directly into the smWSP-ARD or smWSP/smRF-WB using smBLOCKs to quickly plug in these pin compatible design components making it simple to swap in/out numerous different wireless, sensor, memory, and power configurations to completely customize your system and then just as easy to completely change it a day later. Gone are the days of having to work with a sensor evaluation board that has several sensors you would love to change but they are soldered directly to the PCB. Now you can pick and choose your RF, sensor, memory, power, and battery configuration. Secondarily all these components can then be un-plugged from the smWSP-ARD or smWSP/smRF to be either used in a prototype of your own, in a bread-board application, or simply be replaced by a different smBLOCK compatible component.

Overview

smWSP-ARD: Arduino Rev 3 compatible shield. Tailored to work with the nRF52 DK. Available +20dBm Long Range BLE module plugin.

smWSP: Designed to plug directly into any of the Silicon Labs EFM32 or EFR32 Starter Kits. Has an expansion header to connect to the smRF-WB.

smRF-CYW2073x-WB: Design to accommodate Cypress CYW20736/CYW20737 based modules. Can be connected to the smWSP via the expansion header.

Software

Sensor Maestros currently offers firmware examples for several of the pluggable breakout boards that is made available upon purchase of the kits. Soon enough every pluggable breakout board will have associated software that can either be ran from a MCU such as the Silicon Labs EFM32 series, BLE based products from Cypress in the CYW2073x series or the Nordic nRF52832/810 series. A brief listing is shown below. If you don't see what you are looking for feel free to inquire and Sensor Maestros also provides design services for custom developed products.

smMOTN-MPU9250

9-Axis Sensor Fusion

1) smWSP + EFM32: Firmware running NXP Open Source Sensor Fusion Library on the Silicon Labs EFM32 STK's connected to a smWSP with a 9-Axis IMU, smMOTN-MPU9250 plugged into the WSP. Provides Sensor Fusion output to a PC via the USB on the EFM32 STK and utilizes a 3D cube application to display the rotation.
2) smWSP + EFM32 + smRF-CYW2073x-WB: Similar to above but utilizes the Cypress BLE SOC, CYW20736S/CYW20737S SOC to send the Sensor Fusion data to any WIN8/WIN10 PC and utilizes a 3D Cube application to show the rotation.

BLE-smSENSR-LOGR

1) The BLE-smSENSR-LOGR is an example of detecting the type of smSENSR plugged into the smWSP-ARD with firmware running on the Nordic nRF52832. It logs the data with a timestamp to a smMEM Adesto serial flash if the unit is not connected to a BLE Client. Upon connecting to a Client it reads the logged data from the smMEM serial flash and transfers the data. A python script has been developed to print the data to a terminal window.

smSENSR Devices Supported:
smSENSR-LTR303 – Ambient Light Sensor
smSENSR-Si7006 – Humidity/Temp Sensor Combo
smMEM Devices Supported:
Any of the smMEM Adesto Serial Flash Breakout Boards.

MORE TO COME!!

THC Sensor

1) The THC Sensor utilizes the Cypress BLE based smRF-CYW2073x-WB and the smWSP. The CYW2073xS BLE SOC reads the Temp/Humidity combo, smSESNSR-Si7006 along with a CO2 Sensor, the Amphenol T6713 CO2 Sensor. The output is sent to an Android app that displays the Temperature, Humidity, and CO2 Levels.

Loads of examples will be added in the near future. Feel free to inquire.

Design Services

Custom Embedded PCB/Software, Wireless/Mobile Applications, and general design services can be provided by Sensor Maestros for your own application.

Sensor Maestros has vast expertise in Wireless and Sensing applications. We have utilized the Si7006 in various applications. To inquire about Design Services fill out an inquiry form on the Sensor Maestros website.
www.sensormaestros.com/inquiry

smWSP-ARD Description

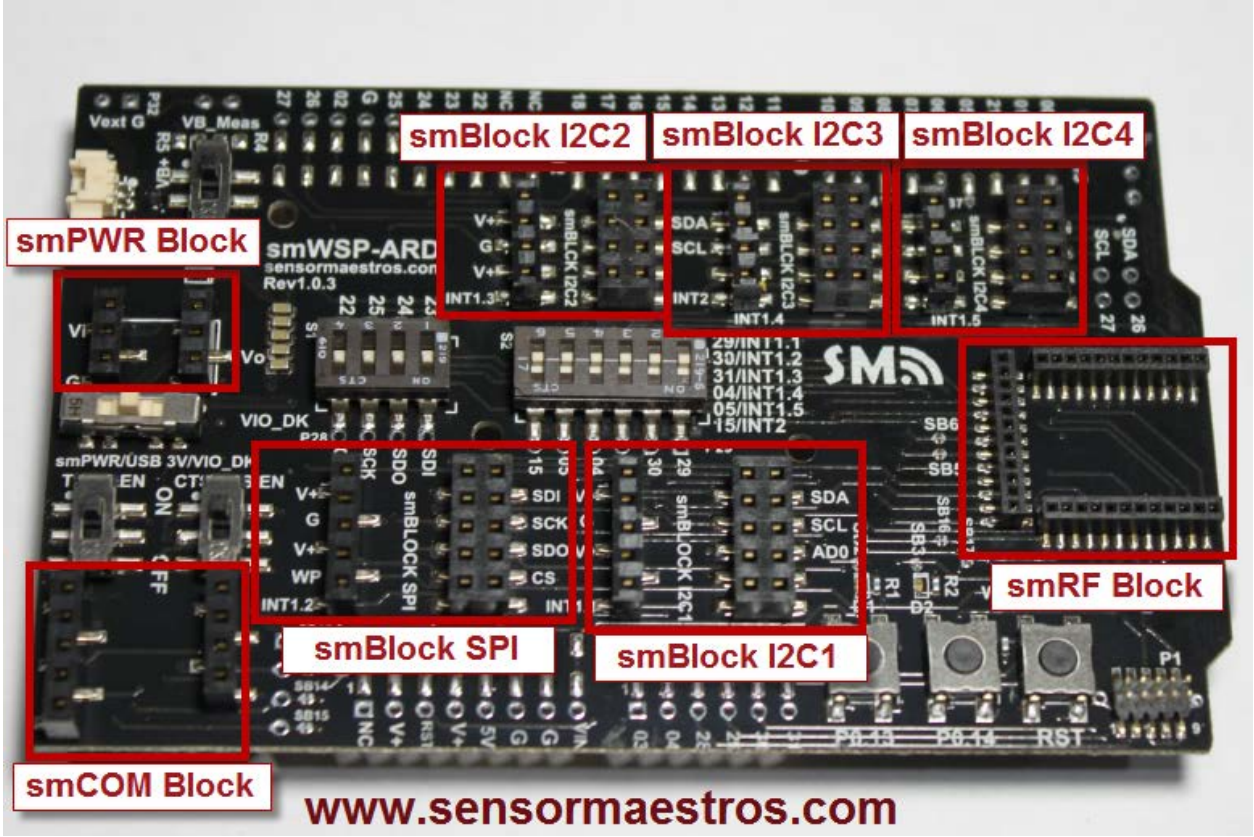
Sensor Maestros is the original inventor of the Rapid Prototyping Platform. Loads of thought and planning was put into the design of the smWSP-ARD. The smWSP-ARD is a Rapid Prototyping Platform for BLE and Sensor development. The smWSP-ARD has been designed to precisely mate with the Nordic nRF52 DK and is compatible with Ardiuno Revision 3. It can be used as a shield with Arduino Revision 3 compatible boards such as the nRF52 DK or as a Stand-alone BLE Sensor development kit with the addition of the smRF-LR832 Long Range modules based on the nRF52832 that provide up to +21dBm output power.

The smWSP-ARD supports all Sensor Maestros smMEM, smSENSR, smMOTN, smCOM, smBAT, and smPWR breakout boards that plug directly into the smWSP-ARD using smBLOCKs to quickly plug in these pin compatible design components making it simple to swap in/out numerous different wireless, sensor, memory, and power configurations to completely customize your system and then just as easy to completely change it a day later. Gone are the days of having to work with a sensor evaluation board that has several sensors you would love to change but they are soldered directly to the PCB. Now you can pick and choose your RF, sensor, memory, power, and battery configuration. Secondarily all these components can then be un-plugged from the smWSP-ARD to be either used in a prototype of your own, in a bread-board application, or simply be replaced by a different smBLOCK compatible component.

- 4 I2C smBLOCKs: Can be used with any smSENSR and smMOTN products
- 1 SPI smBLOCK: Can be used with SPI compatible smMOTN, smSENSR, and all smMEM products
- 1 USB-UART smBLOCK: Can be used with any smCOM products(smCOM-FT230).
- 1 RF smBLOCK: Can be used with any smRF nRF52 based products such as the smRF-LR832.
- 1 Power smBLOCK: Optional smPWR DC/DC and/or Linear Regulator products to provide Voltage regulation from LiPO, AA, AAA, or external Voltage Source.

smBlocks Overview

The concept of smBLOCKs is what makes the Wireless Sensor Platforms so powerful. They provide the ability to plug in/out various components for Wireless, Sensors, Power, and communications. The picture below highlights the major blocks. Each block is further detailed later in this document.

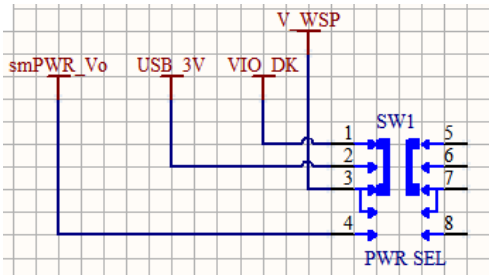


smBLOCK	Description
smBLOCK I2C1	Allows 10pin I2C SM Breakout boards to be plugged into the smWSP-ARD. Ex: smMOTN-MPU9250
smBLOCK SPI	Allows 10pin SPI based SM breakout boards to be plugged into the smWSP-ARD Ex: smMOTN-MPU9250, smMEM-AT45DB0641 other smMEM products
smBLOCK I2C 2, 3, 4	Allows 6 and 8pin I2C SM breakout boards to be plugged into the smWSP-ARD Ex: smSENSR-LTR303, smSENSR-Si7006, etc.
smPWR Block	Allows various DC/DC Regulators to be plugged into the smWSP-ARD Ex: smPWR-MP2148-ADJ
smCOM Block	Allows USB-UART SM devices such as the smCOM-FT230 to be plugged into the system to provide USB connectivity
smRF Block	The smRF block is a general purpose plugin for smRF wireless breakout boards

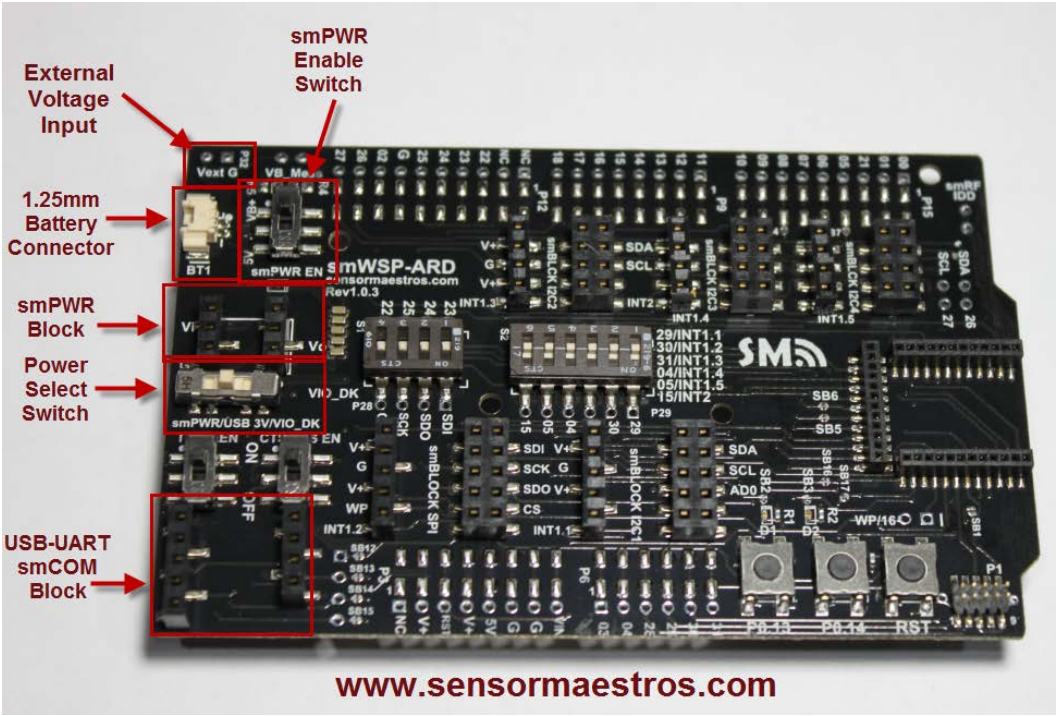
Power Switches

To provide un-paralleled flexibility for Rapid Prototyping a system the smWSP-ARD has several control switches to allow different power sources, individual interrupt lines, enable/disable SPI on the SPI smBLOCK, enable/disable USB-UART functionality, and user input via push-buttons. These control features are outlined below.

Power Selector Switch



NOTE: All selections map to V_WSP voltage net on schematic/pcb.



The ***Power Select Switch*** selects the power source for the smWSP. There are 3 selections as shown below.

- smPWR => Output of smPWR Block. If a LiPO/Battery were plugged into the Battery connector BT1 a smPWR plugin such as the smPWR-MP2148 could be used to regulate from 4.1V to 3.3V or 1.8V. smPWR could be useful if there is an external voltage connected to P32 that is >3.6V. The last scenario is if 5V was being supplied to the smWSP-ARD from an Arduino Compatible base.
- USB_3V => Regulated 3.3V source from a USB-UART residing in the smCOM block such as a smCOM-FT230x. The smCOM-FT230 provides a regulated 3.3V source from 5V USB source.
- VIO_DK => If the smWSP-ARD is plugged into a Nordic nRF52 DK or an identical pinout Nordic Semiconductor evaluation board this eval board can directly power the smWSP-ARD with 3.3V.

smPWR Enable/Selector Switch

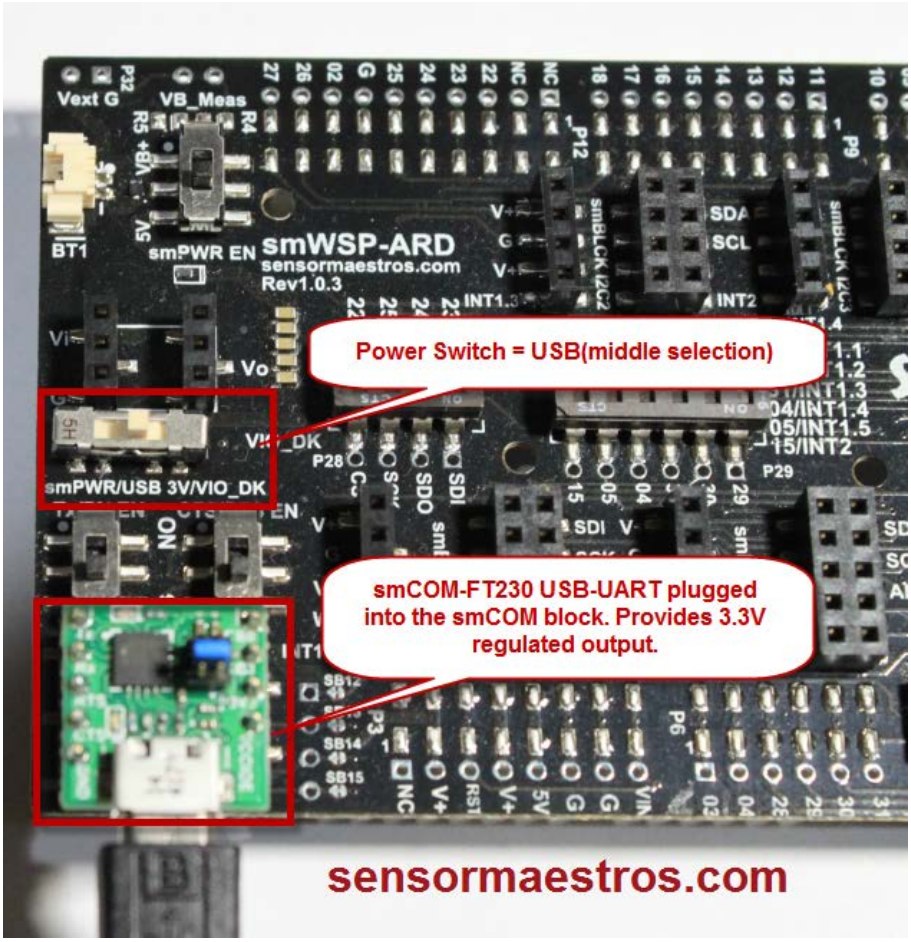
The voltage source desired to be regulated by the smPWR block can be selected between the following 2 voltage sources.

- VBAT => Battery source connected to BT1(1.25mm connector) OR External Voltage(P32)
- 5V => 5V source from a Arduino compatible base

NOTE: The V_WSP net has 235uF of Bulk capacitance to assist with RF pulse currents

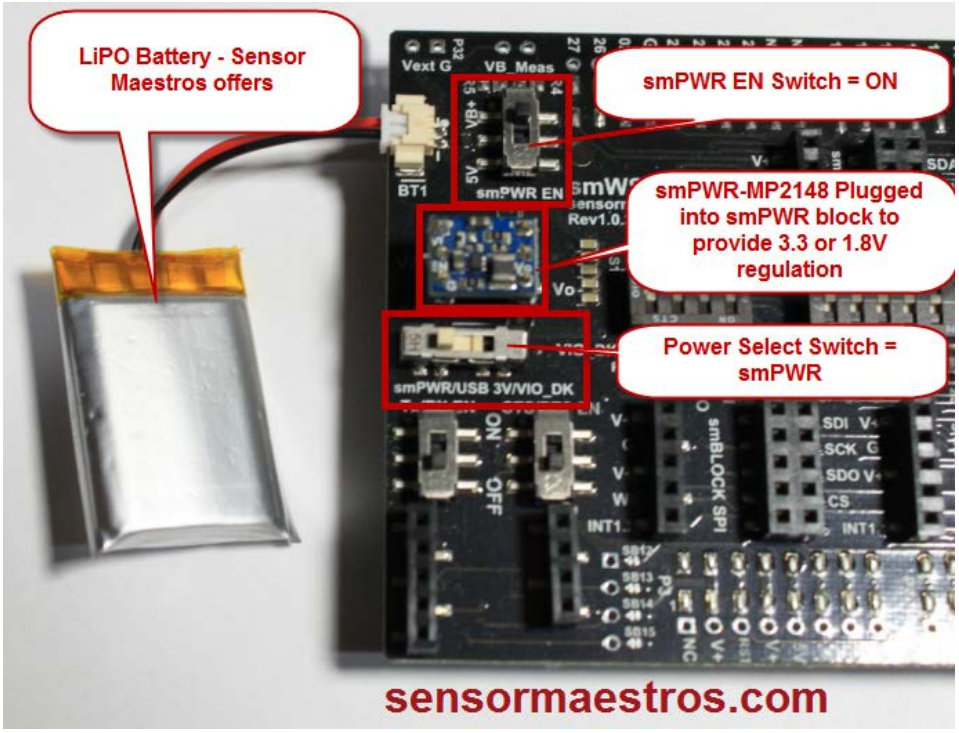
USB Powered

Power Select Switch = USB (middle selection)



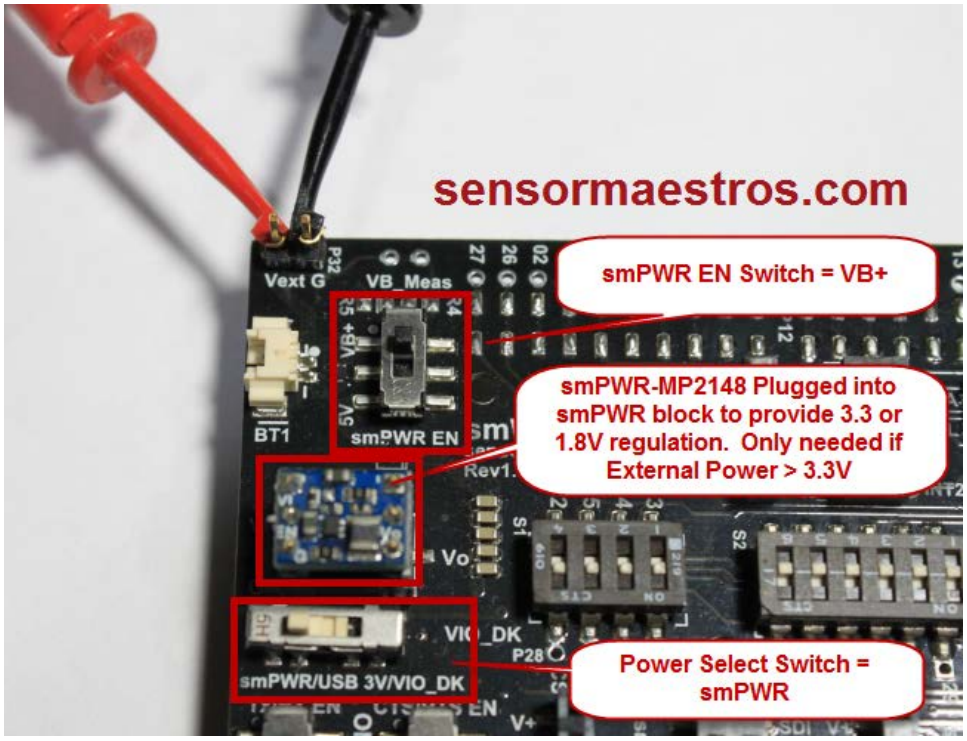
Battery Powered

Power Select Switch = smPWR smPWR EN Switch = VB+ (upper position)



External Power

P32 = External Power Supply smPWR EN Switch = VB+ Power Selector Switch = smPWR



Control Switches

Interrupt Line Selector DIP Switch(S2)

S2 DIP Switch provides the ability to connect individual interrupt lines from either the Arduino base such as a nRF52 DK or to the smRF smBLOCK on the smWSP-ARD itself. There is also an unpopulated 2.54mm pitch header that can be used to directly wire in other GPIO's to act as an Interrupt Line.

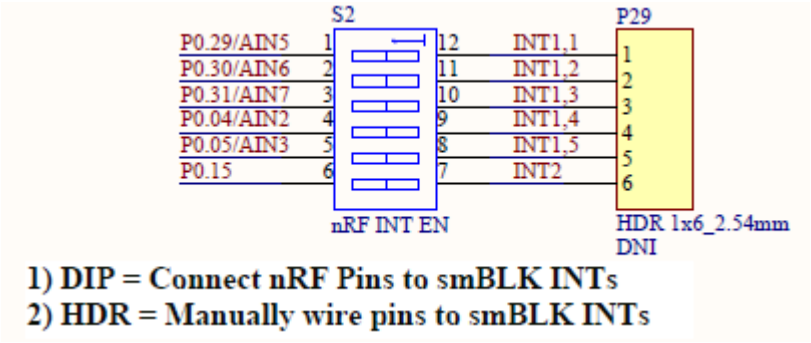


Figure 1: S2 Interrupt DIP Switch 1

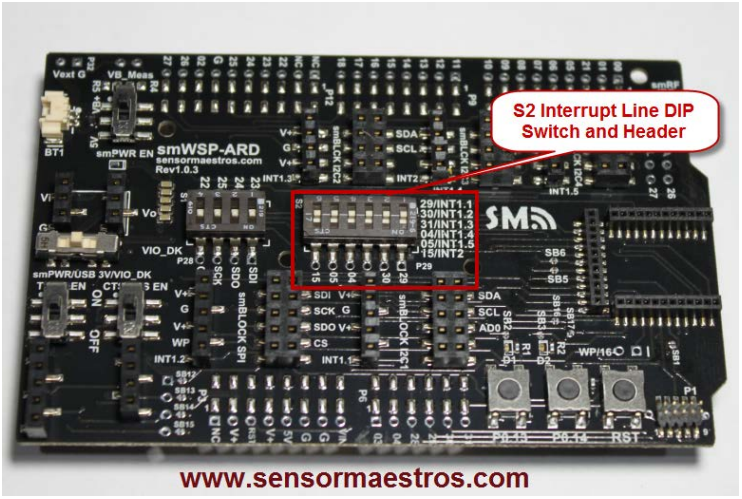


Figure 2: S2 DIP SW Image

DIP Selector	smBLOCK	GPIO on nRF52 DK or smRF BLOCK	nRF 52 DK Notes	Arduino Rev 3 Mapping
1	smBLOCK I2C 1(INT1,1)	P0.29	No Conflicts	GPIO A2
2	smBLOCK SPI(INT1,2)	P0.30	No Conflicts	GPIO A4
3	smBLOCK I2C 2(INT1,3)	P0.31	No Conflicts	GPIO A5
4	smBLOCK I2C 3(INT1,4)	P0.04	No Conflicts	GPIO A1
5	smBLOCK I2C 4(INT1,5)	P0.05	**Also tied to UART_RTS**	Not Mapped. Can be mapped via header.
6	smBLOCK I2C 2,3,4(INT2)	P0.15	**Also tied to Pushbutton 3** Used for sensors that have either 2 interrupts or interrupt on right-hand side of smBLOCK	GPIO D4

Table 1: Interrupt DIP SW

SPI Enable DIP Switch(S1)

The SPI Enable DIP Switch(S1) provides the capability to connect/disconnect GPIO lines to the ***smBLOCK SPI***. This is useful if either these GPIO lines are desired to be used for something else OR if you want to use the headers on the edge of the smWSP-ARD to route these pins to an external device. Sliding the DIP switches to the ON position connects the individual GPIOs as shown below to the ***smBLOCK SPI***. Alternatively any GPIO can be manually jumpered to provide SPI functionality by cutting the Solder Bridges and manually jumper-wiring the GPIOs into the header below S1.

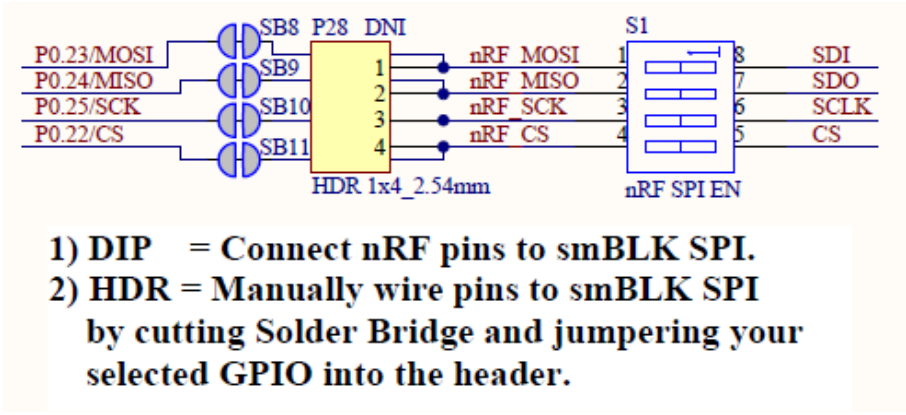


Figure 3: SPI Enable DIP Switch

Figure 4: SPI Enable DIP(S1) Image

DIP Position	SPI Pin Name	GPIO on nRF52 DK or smRF BLOCK	DIP Position = ON	nRF 52 DK Notes	Arduino Mapping
1	SDI/MOSI	P0.23	Connected to smBLOCK SPI	No Conflicts	D11(MOSI, PWM)
2	SDO/MISO	P0.24	Connected to smBLOCK SPI	No Conflicts	D12(MISO)
3	SCK	P0.25	Connected to smBLOCK SPI	No Conflicts	D13(SCK)
4	CS	P0.22	Connected to smBLOCK SPI	No Conflicts	D10(SS, PWM)

NOTE: GPIO Pins are labeled on Silkcreen for the SPI Enable DIP Switch.

smCOM Block(USB-UART) Line Enable

To allow complete flexibility with using a USB-UART there are 2 slide switches that allow the UART Rx/Tx and CTS/RTS to be connected or disconnected to either a smRF plugin or an Arduino compatible base such as the nRF52 DK. As with the Interrupt and SPI lines these pins can be manually wired if desired by the un-populated 2.54mm header to the left of the smCOM Block.

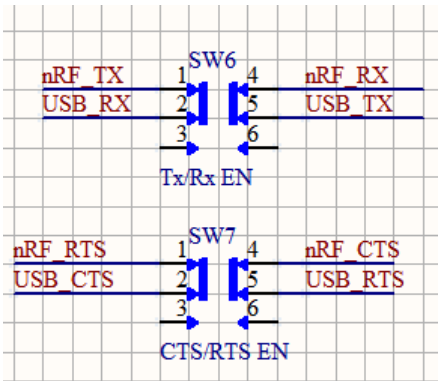


Figure 5: smCOM/UART Line Enable Switches, SCH

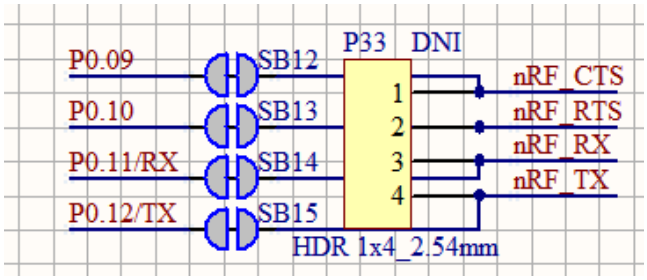


Figure 7: smCOM/UART Default GPIO Connections

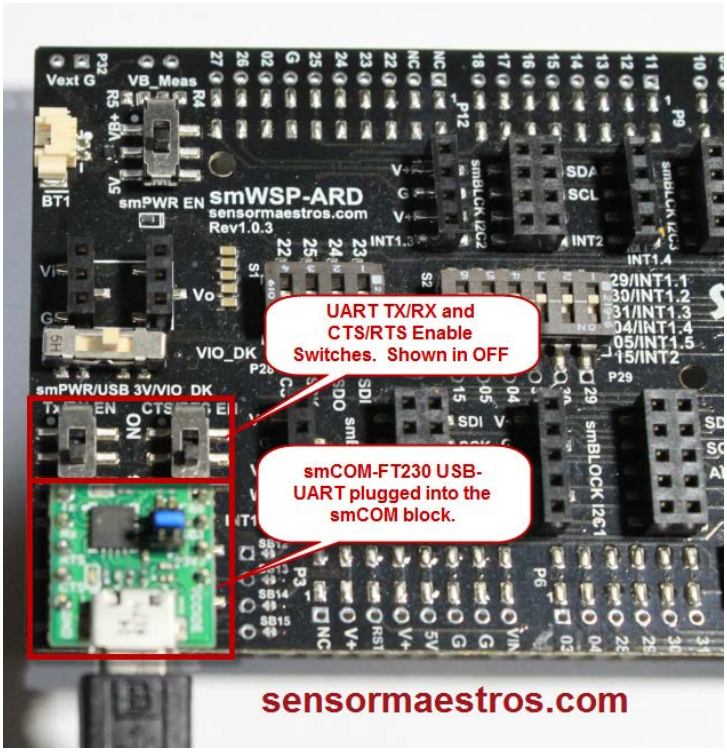


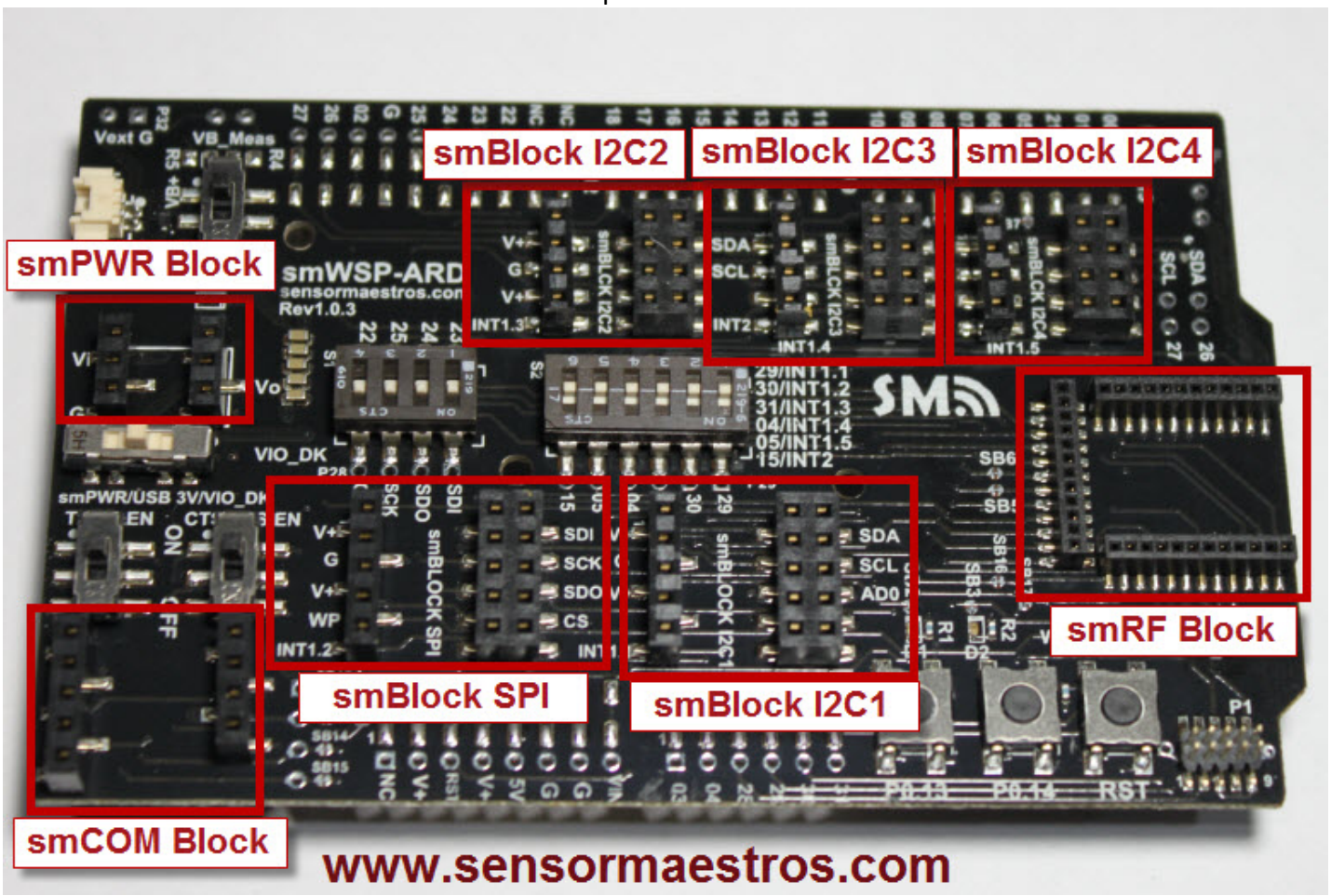
Figure 6: smCOM/UART Line Enable Switches with smCOM-FT230 plugged into smCOM Block.

UART Pin	nRF52 DK/smRF BLOCK GPIO	Switch Position = ON	nRF 52 DK Notes	Arduino Mapping
TX	P0.12	P0.12 connected to TX on smCOM	No Conflicts	D1(TX)
RX	P0.11	P0.11 connected to RX on smCOM	No Conflicts	D0(RX)
CTS	P0.10	P0.10 connected to CTS on smCOM	NFC2 Pin	NONE
RTS	P0.09	P0.09 connected to RTS on smCOM	NFC1 Pin	NONE

smBLOCKS

A key design aspect of the Wireless Sensor Platforms from Sensor Maestros, is the concept of smBLOCKs that provide plug in capability for numerous types of Sensors, Memory, Power, Communication, RF functionality that can be swapped/replaced by simply removing the particular smSENSR, smMOTN, smMEM, smPWR, smRF, smCOM device and plugging in another module to test for example a different sensor or increase memory size, or simply add another sensor into the system.

There are 8 total smBLOCKs on the smWSP-ARD platform and are described below.



smBLOCK Product Types

1) smSENSR = Environmental Sensors: Temperature, Pressure, Humidity, Light, etc.
2) smMOTN = Motion Sensors: 3/6/9 Axis Motion Sensors, Accelerometers, Gyroscopes, Magnetometers
3) smMEM = Memory: Serial Flash, Resistive Memory, etc.
4) smPWR = Power Modules: LDO, DC/DC Buck, Boost
5) smCOM = Communication: USB-UART, etc.
6) smRF = Wireless: BLE modules.

smBLOCK SPI

The smBLOCK SPI can be used with any of the 10pin SPI based smBLOCK breakout boards such as the ***smMEM***, ***smMOTN***, ***smSENSR***, etc. devices. This block can accept both 400 and 500mil spaced headers. To enable the smBLOCK use the SPI Enable DIP Switch(S1) to connect the respective GPIO lines to the smBLOCK SPI headers.

GPIO:

1) FSYNC/WP: FSYNC is an option on some smMOTN Sensors such as smMOTN-MPU9250. WP is for Write Protect on smMEM Serial Flash devices.
2) INT1,2: Interrupt connection 1,2. Refer to Interrupt Line Selector DIP Switch(S2).
3) SPI Lines: SDI, SCLK, SDO, CS

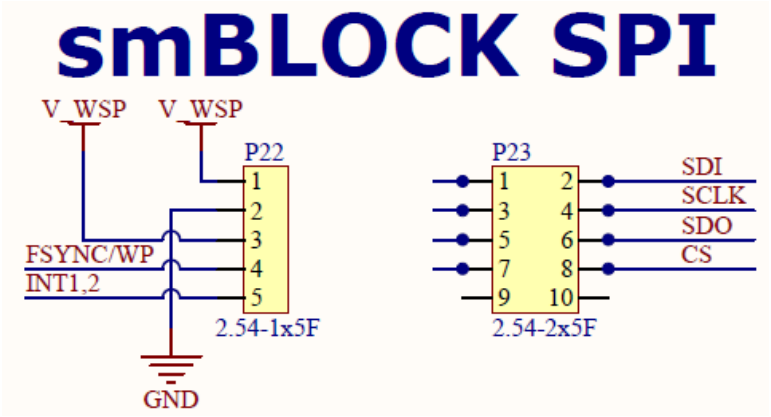


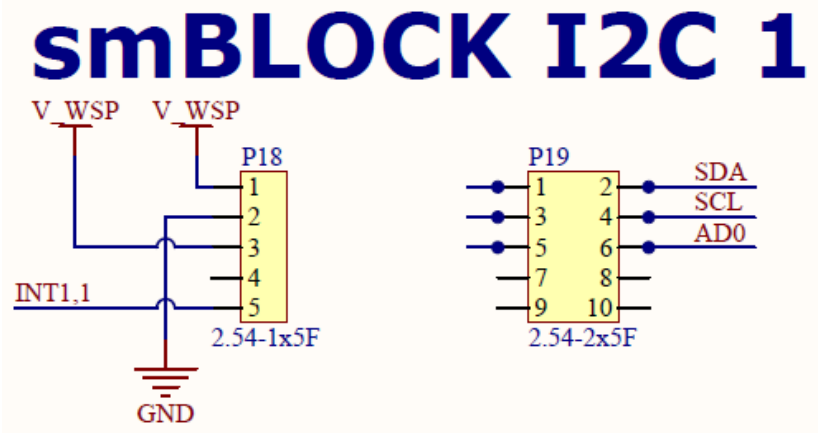
Figure 8: smBLOCK SPI Schematic

smBLOCK I2C1

The smBLOCK I2C1 can be used with any of the 10pin I2C based smBLOCK breakout boards such as ***smMEM***, ***smMOTN***, ***smSENSR***, etc. This block can accept both 400 and 500mil spaced headers.

GPIO:

1) INT1,1: Interrupt connection 1,1. Refer to Interrupt Line Selector DIP Switch(S2).
2) AD0: I2C Address 0. This is sometimes used as the LSB for the I2C Slave Address. Default on ***smXXX*** devices is LOW/Ground.
3) I2C Lines: SDA, SCL

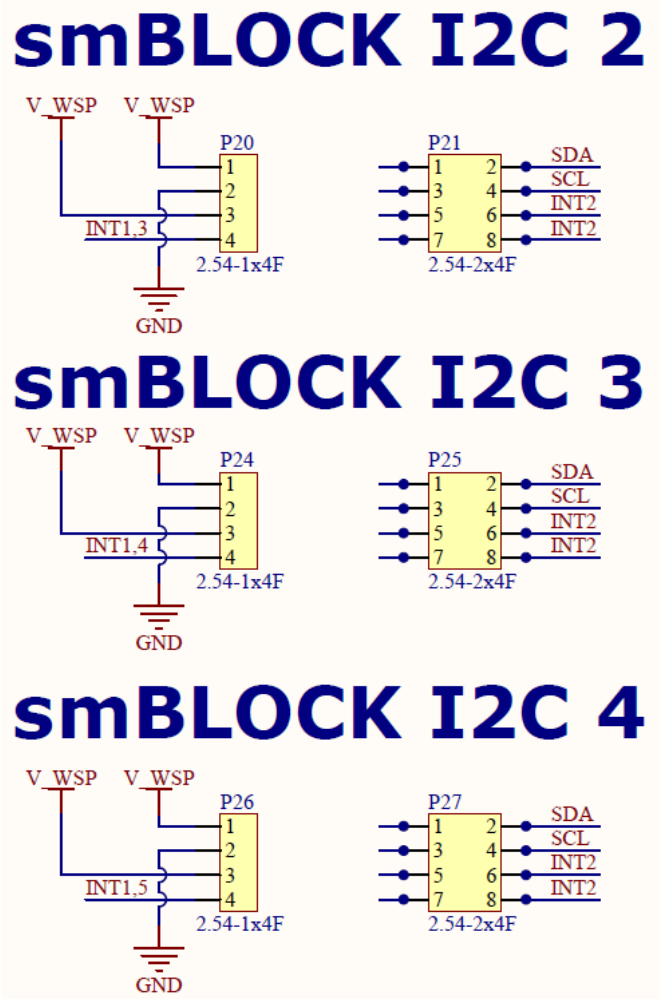


smBLOCK I2C2,3,4

The smBLOCK I2C2,3,4 block locations can be used with any 6 or 8pin I2C based smBLOCK breakout boards such as ***smMEM***, ***smMOTN***, ***smSENSR***, etc. These blocks are identical to each other though each blocks has one unique Interrupt line for each block. These blocks can accept 300 and 400mil spaced headers.

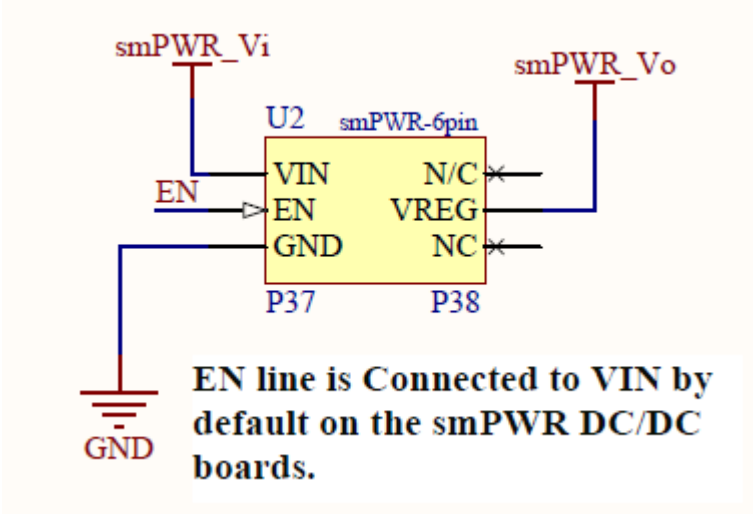
GPIO:

1) INT1,3/INT1,4/INT1,5: Unique Interrupt lines to the individual blocks. Refer to Interrupt Line Selector DIP Switch(S2).
2) INT2: Common Interrupt Line to all Blocks. Used on some smMOTN products that have 2 interrupt lines such as the ***smMOTN-MMA8652***.
3) I2C Lines: SDA, SCL

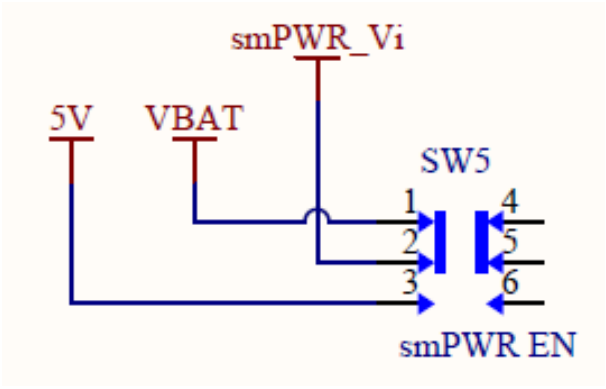


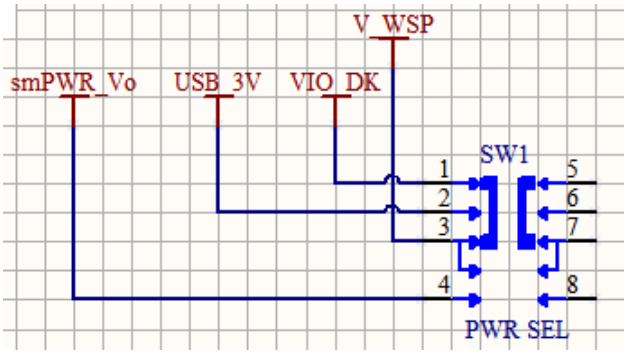
smPWR

The smPWR block can be used to add Power Management functionality such as DC/DC converters to provide either Buck functionality from a LiPO or Boost Functionality from Alkalines or coin cells depending on what the intended system voltage is desired to be.



If the smPWR block is used you will need to make use of the smPWR Enable/Selector Switch and slide the Power Selector Switch to the smPWR selection(left-most position).





Some examples of possible uses of the smPWR block and use of the smPWR Enable/Selector Switch are provided below.

Example 1: smWSP-ARD is being used as an Arduino Shield and the desire is to power from the 5V supply on the Arduino compatible base. The 5V would need to be regulated to something 3.6V or less.

1) smPWR-MP2148-ADJ is plugged into the smPWR block(default is 3.0V but can be modified for 1.8V).
2) smPWR Enable/Selector Switch = 5V.

Example 2: A LiPO battery is connected to the Battery Connector(BT1). The ~4V LiPO voltage will need to be regulated to 3.6V or less.

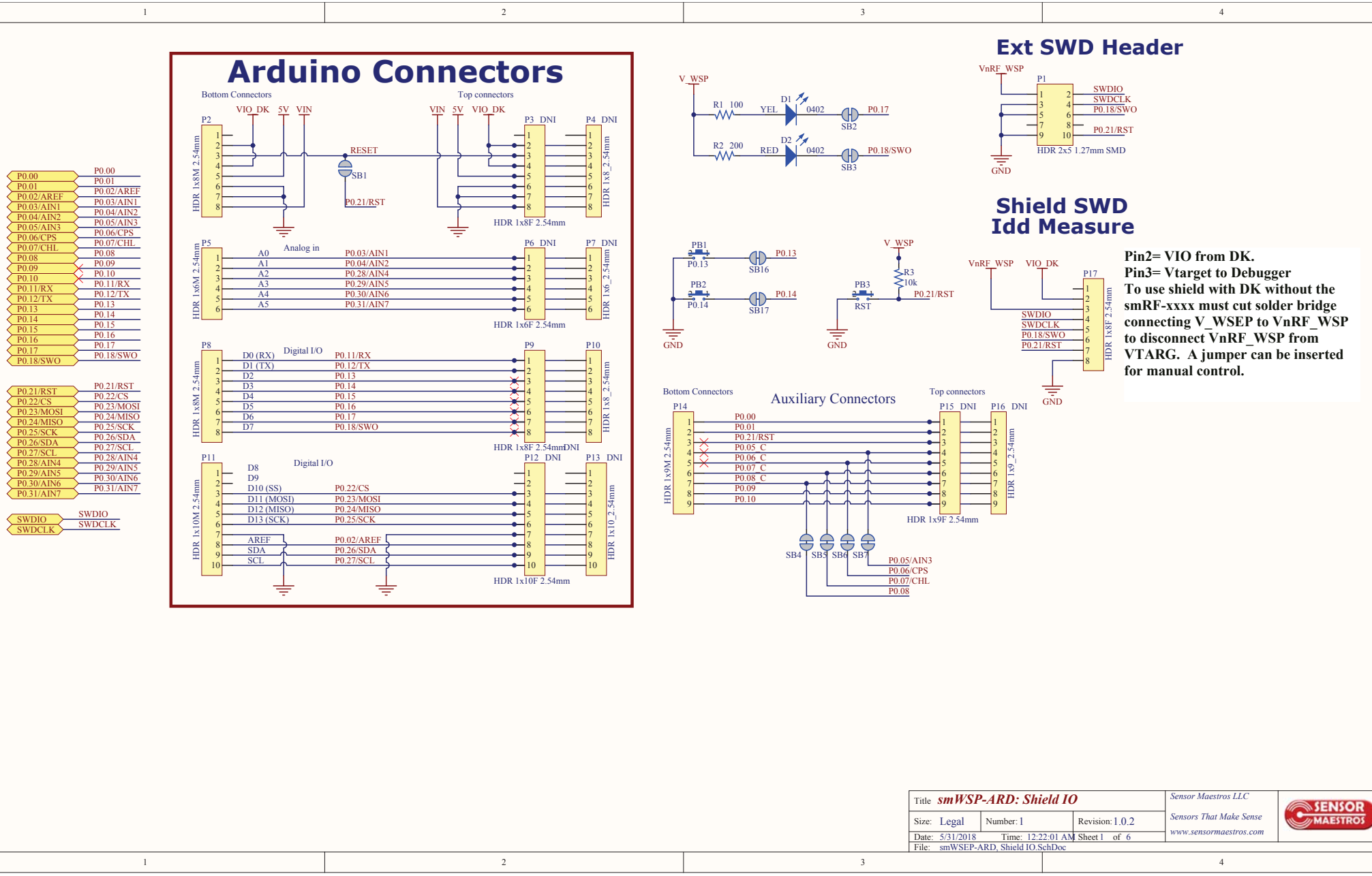
1) smPWR-MP2148-ADJ is plugged into the smPWR block(default is 3.0V but can be modified for 1.8V).
2) smPWR Enable/Selector Switch = VB+ (Battery or External supply selection)

Example 3: An external power supply is connected to P32(Vext / G). This external supply needs to be regulated to 3.6V or less.

1) smPWR-MP2148-ADJ is plugged into the smPWR block(default is 3.0V but can be modified for 1.8V).
2) smPWR Enable/Selector Switch = VB+ (Battery or External supply)

Example 4: An external power supply or single cell Alkaline(1.5V) is connected to the smWSP-ARD either to the Battery Connector or wired to P32(Vext / G) that is desired to be 'Boosted' to 3.3V.

1) smPWR-MCP16251 or smPWR-MCP16252 is plugged into the smPWR block to 'Boost' the input voltage to 3.3V.
2) smPWR Enable/Selector Switch = VB+ (Battery or External supply)


Arduino Connectors
Bottom Connectors
Top connectors
P2
P3 DNI
P4 DNI
VIO_DK 5V VIN
VIN 5V VIO_DK
HDR 1x8M 2.54mm
HDR 1x8_2.54mm
HDR 1x8F 2.54mm
RESET
SB1
P0.21/RST
P5
P6 DNI
P7 DNI
Analog in
A0 P0.03/AIN1
A1 P0.04/AIN2
A2 P0.28/AIN4
A3 P0.29/AIN5
A4 P0.30/AIN6
A5 P0.31/AIN7
HDR 1x6M 2.54mm
HDR 1x6_2.54mm
HDR 1x6F 2.54mm
P8
P9
P10
Digital I/O
D0 (RX) P0.11/RX
D1 (TX) P0.12/TX
D2 P0.13
D3 P0.14
D4 P0.15
D5 P0.16
D6 P0.17
D7 P0.18/SWO
HDR 1x8M 2.54mm
HDR 1x8_2.54mm
HDR 1x8F 2.54mmDNI
P11
P12 DNI
P13 DNI
Digital I/O
D8
D9
D10 (SS) P0.22/CS
D11 (MOSI) P0.23/MOSI
D12 (MISO) P0.24/MISO
D13 (SCK) P0.25/SCK
AREF P0.02/AREF
SDA P0.26/SDA
SCL P0.27/SCL
HDR 1x10M 2.54mm
HDR 1x10_2.54mm
HDR 1x10F 2.54mm
P0.00 P0.00
P0.01 P0.01
P0.02/AREF P0.02/AREF
P0.03/AIN1 P0.03/AIN1
P0.04/AIN2 P0.04/AIN2
P0.05/AIN3 P0.05/AIN3
P0.06/CPS P0.06/CPS
P0.07/CHL P0.07/CHL
P0.08 P0.08
P0.09 P0.09
P0.10 P0.10
P0.11/RX P0.11/RX
P0.12/TX P0.12/TX
P0.13 P0.13
P0.14 P0.14
P0.15 P0.15
P0.16 P0.16
P0.17 P0.17
P0.18/SWO P0.18/SWO
P0.21/RST P0.21/RST
P0.22/CS P0.22/CS
P0.23/MOSI P0.23/MOSI
P0.24/MISO P0.24/MISO
P0.25/SCK P0.25/SCK
P0.26/SDA P0.26/SDA
P0.27/SCL P0.27/SCL
P0.28/AIN4 P0.28/AIN4
P0.29/AIN5 P0.29/AIN5
P0.30/AIN6 P0.30/AIN6
P0.31/AIN7 P0.31/AIN7
SWDIO SWDIO
SWDCLK SWDCLK
V_WSP
R1 100
YEL
D1
0402
P0.17
SB2
R2 200
RED
D2
0402
P0.18/SWO
SB3
Ext SWD Header
VnRF_WSP
P1
SWDIO
SWDCLK
P0.18/SWO
P0.21/RST
HDR 2x5 1.27mm SMD
GND
Shield SWD
Idd Measure
PB1
P0.13
SB16
PB2
P0.14
SB17
GND
V_WSP
R3
10k
PB3
RST
P0.21/RST
GND
VnRF_WSP
VIO_DK
P17
SWDIO
SWDCLK
P0.18/SWO
P0.21/RST
HDR 1x8F 2.54mm
GND
Pin2= VIO from DK.
Pin3= Vtarget to Debugger
To use shield with DK without the smRF-xxxx must cut solder bridge connecting V_WSEP to VnRF_WSP to disconnect VnRF_WSP from VTARG. A jumper can be inserted for manual control.
Auxiliary Connectors
Bottom Connectors
Top connectors
P14
P15 DNI
P16 DNI
P0.00
P0.01
P0.21/RST
P0.05_C
P0.06_C
P0.07_C
P0.08_C
P0.09
P0.10
HDR 1x9M 2.54mm
HDR 1x9_2.54mm
HDR 1x9F 2.54mm
SB4 SB5 SB6 SB7
P0.05/AIN3
P0.06/CPS
P0.07/CHL
P0.08
Title smWSP-ARD: Shield IO
Size: Legal
Number: 1
Revision: 1.0.2
Date: 5/31/2018
Time: 12:22:01 AM
Sheet 1 of 6
File: smWSEP-ARD, Shield IO.SchDoc
Sensor Maestros LLC
Sensors That Make Sense
www.sensormaestros.com
SENSOR MAESTROS

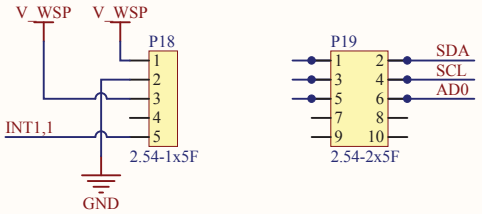
P0.00
P0.01
P0.04/AIN2
P0.05/AIN3
P0.08
P0.09
P0.10
P0.15
P0.16

P0.22/CS
P0.23/MOSI
P0.24/MISO
P0.25/SCK
P0.26/SDA
P0.27/SCL

P0.29/AIN5
P0.30/AIN6
P0.31/AIN7

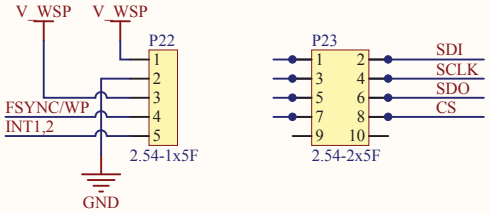
10pin smSESNR's
I2C ONLY 500/400 MIL Spaced Header
Typically for smSENSR's in Default I2C Mode

smBLOCK I2C 1



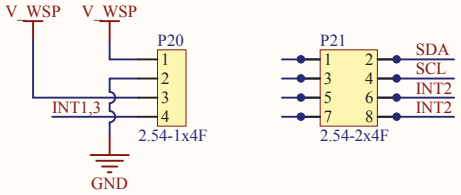
10pin smSESNR's
SPI ONLY 500/400 MIL Spaced Header
Typically for smMEM or smSENRs in SPI Mode.

smBLOCK SPI

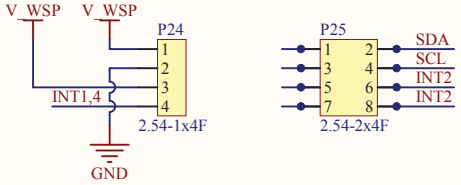


6/8pin smSENSR's
I2C ONLY 400/300 MIL Spaced Headers

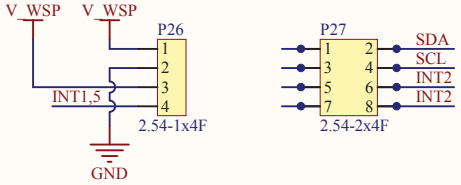
smBLOCK I2C 2

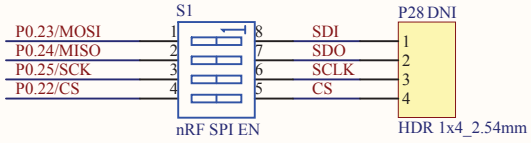


smBLOCK I2C 3

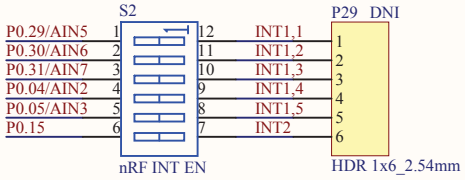


smBLOCK I2C 4



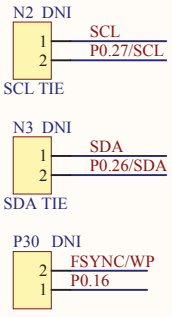


1) DIP = Connect nRF pins to smBLK SPI.
2) HDR = Manually wire pins to smBLK SPI by cutting Solder Bridge and jumpering your selected GPIO into the header.



1) DIP = Connect nRF Pins to smBLK INTs
2) HDR = Manually wire pins to smBLK INTs

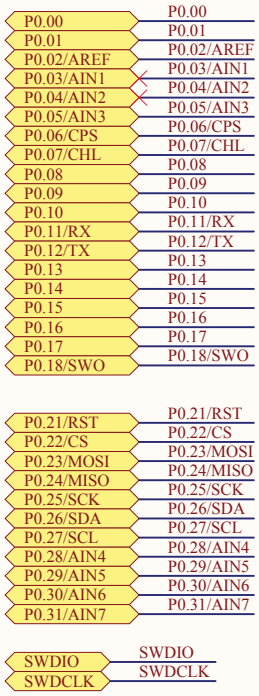
NOTE: P0.00,P0.01,P0.05, P0.08 are on nRF52 DK Auxiliary Connector which is not populated by default. To use these Pins with the nRF52 DK this header must be populated.



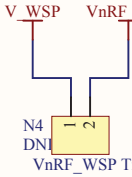
I2C Net TIEs. Cut trace to disconnect default pins P0.27/SCL and P0.26/SDA

JMPR to allow GPIO Control of FSYNC/WP if needed

Title	*smWSP-ARD smBLOCKS*		*Sensor Maestros LLC*
Size: Letter	Number: 2	Revision: 1.0.2	*Sensors That Make Sense*
Date: 5/31/2018	Time: 12:22:02 AM	Sheet 2 of 6	*www.sensormaestros.com*
File: smWSEP-ARD, smBLOCKS.SchDoc			



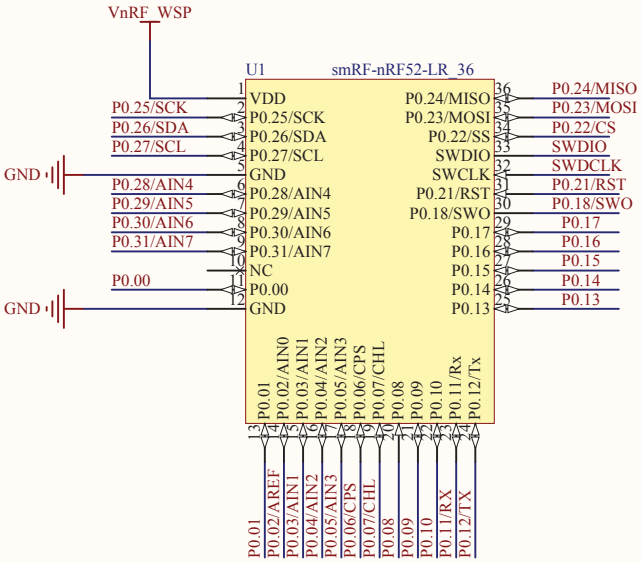
IDD Measure



Cut Trace and Insert DMM

To use shield with DK without the smRF-xxxx. Cut the trace connecting V_WSP to VnRF_WSP to disconnect VnRF_WSP from VTARG. A jumper can be inserted for manual control.

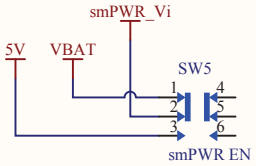
smRF-LRxxx Female Receiver

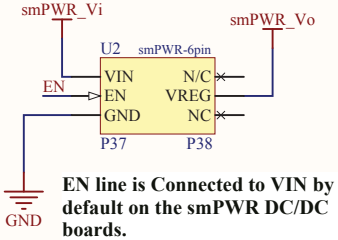


Receiver uses Sockets: P34, P35, P36

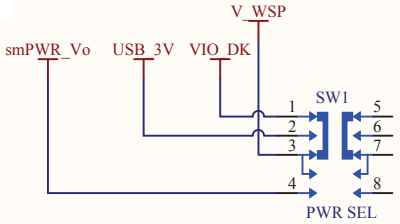
Title	***smRF-LRxxx Carrier Socket***		*Sensor Maestros LLC*
Size: Letter	Number: 3	Revision: V1.1	*Sensors That Make Sense*
Date: 5/31/2018	Time: 12:22:02 AM	Sheet 3 of 6	*www.sensormaestros.com*
File: smRF-LRxxx, Receiver.SchDoc			

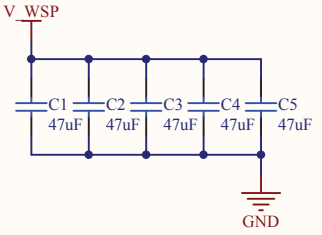
smPWR BLOCK is ONLY needed if an external Battery >3.6V is plugged into the smBAT Connector OR an external voltage is supplied >3.6V





EN line is Connected to VIN by default on the smPWR DC/DC boards.



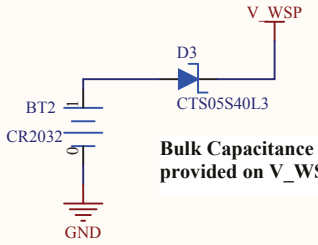


Title	***smWSP-ARD: Power***		*Sensor Maestros LLC*
Size: Letter	Number: 4	Revision: V1.0.2	*Sensors That Make Sense*
Date: 5/31/2018	Time: 12:22:02 AM	Sheet 4 of 6	*www.sensormaestros.com*
File: smWSEP-ARD, Pwr.SchDoc			

Sensor Maestros will be offering several Battery options for the WSEP:
Current Offerings:
1. Varta CP1654 Rechargable LiION, smBAT-CP1654.
2. 300mAh Rechargable LiPO

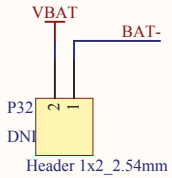
Coming Soon:
1. 300mAh Qi Wireless Charging LiPO.
2. Feel free to contact us with Suggestions

CR2032 Holder



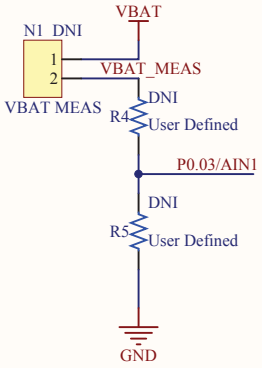
Bulk Capacitance is provided on V_WSP.

VEXT Connector



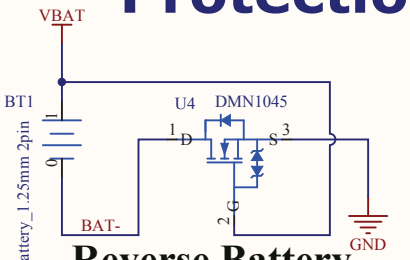
Use to supply External Power to WSP.
Voltages >3.3V use smPWR EN for DC/DC.
Voltages <3.3V use wire jumper from smPWR_Vi to smPWR_Vo.
Use PWR_SEL to select smPWR.

VBAT Measure



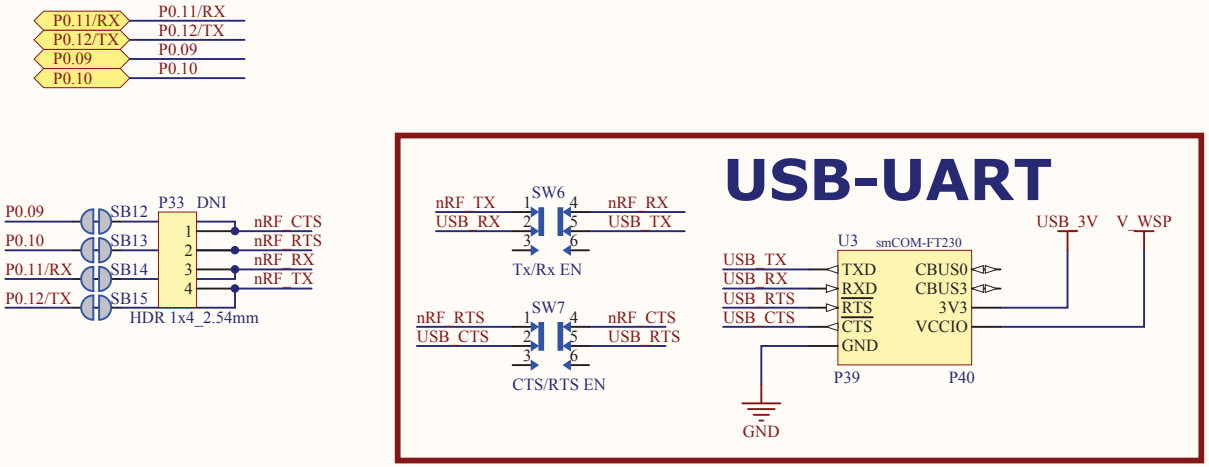
Appropriate R values for voltage divider should be chosen by user depending on Battery Type and operating voltage to scale battery voltage appropriately!! These are intentionally left unpopulated.

Reverse Voltage Protection



Reverse Battery Protection FET

Title	***smWSP-ARD: smBAT/VEXT***		*Sensor Maestros LLC*
Size: Letter	Number: 5	Revision: V1.0.2	*Sensors That Make Sense*
Date: 5/31/2018	Time: 12:22:02 AM	Sheet 5 of 6	*www.sensormaestros.com*
File: smWSEP-ARD, smBAT.SchDoc			



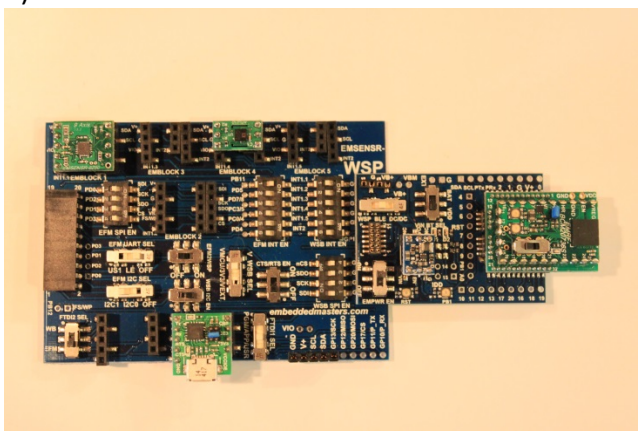
Title	***smWSP-ARD: smCOM***		*Sensor Maestros LLC*
Size: Letter	Number: 6	Revision: 1.0.2	*Sensors That Make Sense*
Date: 5/31/2018	Time: 12:22:02 AM	Sheet 6 of 6	*www.sensormaestros.com*
File: smWSEP-ARD, smCOM.SchDoc			

Additional Wireless Sensor Platforms

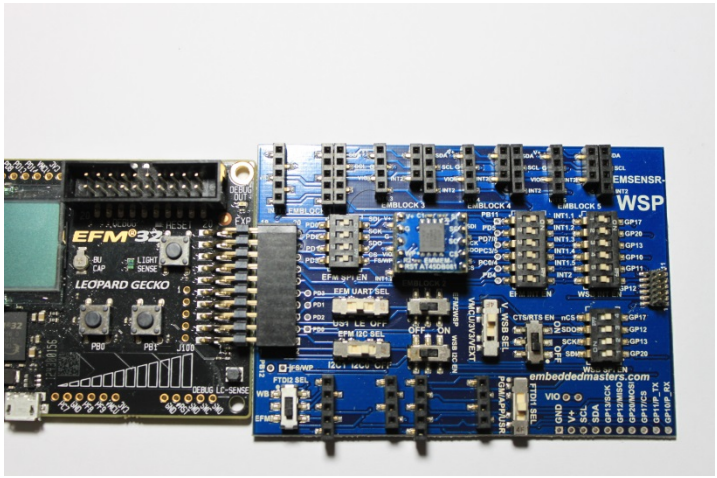
Wireless Sensor Prototype

The ***smWSP*** is a platform that consists of either the ***smWSP*** and ***smRF-CYW2073x-WB*** and also the Silicon Labs EFM32/EFR32 Starter Kit. There are several combinations in how the boards can be used with or without the other boards. 3 options are outlined below.

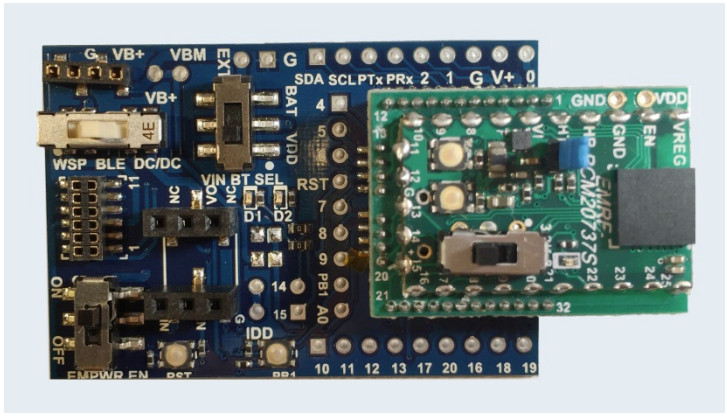
1) smSENSR-WSP + smRF-CYW2073x-WB



2) smSENSR-WSP + EFM/EFR32 STK



3) smRF-CYW2073x-WB(standalone BTLE evaluation board)



smWSP

The ***smWSP*** (Wireless Sensor Prototype) is a board that allows the Sensor Maestros ***smSENSR***, ***smMEM***, ***smCOM***, ***smBAT*** products to be plugged into the WSP allowing Rapid Prototyping of a Sensor/Wireless Sensor system. On the right hand side it can be directly connected to the ***smRF-CYW2073x-WB*** to add BTLE capability and on the Left-hand side it can directly connect to **ANY** of the Silicon Labs ***EFM32/EFR32 Starter kits*** to add a high performance/ultra-low power MCU capability to a system. The WSP has been designed with a Slide Switch to accommodate the slight variations of the EFM32 Starter Kits.

The ***smWSP*** can be used with the ***smRF-CYW2073x-WB*** or with the EFM32 Starter Kits OR with both.

Features

- Allows use of all Sensor Maestros ***smSENSR***, ***smMEM***, ***smCOM, smBAT*** Products
    - I2C and SPI slots available
- Direct Connection to ***smRF-CYW2073x-WB***, for easy programming/debugging of BTLE plugins.
- Direct Connection with all Silicon Labs EFM/EFR32 Starter Kits
- 2 COM-FT230/USB-UART slots
- Selectable Voltage between: VMCU(EFM32 Starter Kits), 3V3(from EMCOM-FT230), or from Regulated voltage supplied by ***smRF-CYW2073x-WB*** (typically when the ***smRF-CYW2073x-WB*** is powered from a battery and uses the DC/DC converter to provide regulated voltage to the BTLE module.
- Allows for UART, LPUART, and SPI serial communication from the EFM32 Starter kits to the ***smRF-CYW2073x-WB***. Selectable with Slide Switches and DIP switch selectors.
- Several GPIO can be directly connected between EFM32 STK's and ***smRF-CYW2073x-WB***
- GPIO pins can individually be connected to Sensor INT lines for individual Interrupt control

smRF-CYW2073x-WB

The ***smRF-2073x-WB***(Wireless Base) provides a means to plug in BTLE module carrier boards. It also has a connector that allows the ***emBAT*** products to be plugged into the kit. The ***smRF-CYW2073x-WB*** can be used as a Standalone Eval/prototype board OR can be connected to the ***smWSP*** which allows it to be programmed by the ***smCOM-FT230*** and allows it to connect to any of the ***smSENSR***, ***smMEM, smCOM*** products for rapid prototyping. There are 2 ***smCOM-FT230*** slots on the ***smSENSR-WSP*** so one may be dedicated to UART Programming/Bootload while the other is used for debug output. With the ***smWSP*** connected to the ***smRF-CYW2073x-WB*** it also allows the user to connect to any of the Silicon Labs EFM/EFR32 Starter Kits and allows for SPI and UART COMs to the EFM32 Starter Kits and allows for several GPIO's to be directly connected to the EFM32 Starter Kit. The following carrier boards that plug directly into the WSP are the following…

smRF-CYW20736S-C: Broadcom BCM20736S based.
smRF-CYW20737S-C: Broadcom BCM20737S based.

Features

- Pluggable Wireless Socket. Allows for multiple options for wireless connection.
- Direct connection to ***smWSP*** for Rapid Sensor development and easy programming/debugging of the BTLE modules.
- ***smBAT*** battery READY for multiple Battery Options.
- Small but useable size with easy probing of all SOC pins.