Sheet: External Input

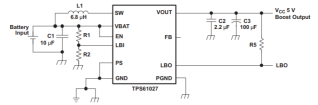
Estimated BOM cost: $0.03

Alt Power Input

File: ExternalInput.sch

Sheet: Boost Converters

Estimated BOM cost: $0.60



List of Components:
U1 = TPS61027DRC
L1 = EPCOS B82462-G4682
C1, C2 = X7R,X5R Ceramic
C3 = Low ESR Tantalum

Figure 24. Power Supply Solution for Maximum Output Power Operating From a Single Alkaline Cell

Power Conversion

File: Boost.sch

Sheet: USB Input

Estimated BOM cost: $1.00
($0.02 without serial to usb)

USB Input (Power/serial)

File: USB_Input.sch

Sheet: Sensors

File: Sensors.sch

H1 H2 H3 H4

GND

Sheet: User Input/Output

Estimated BOM cost: $0.05

User I/O

File: UserInputOutput.sch

Sheet: Programming

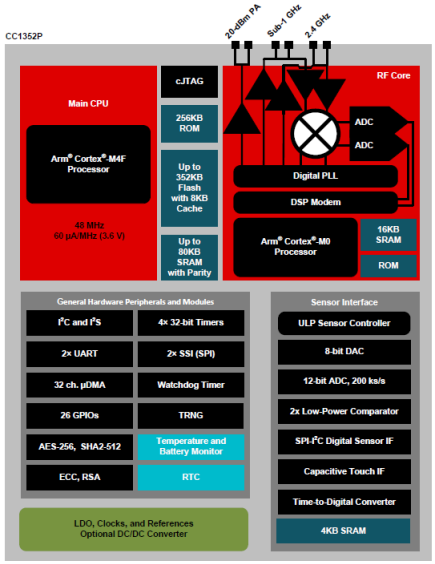
Estimated BOM cost: $0.00

Programming

File: Programming.sch

Sheet: RF

Estimated BOM cost: $1.27

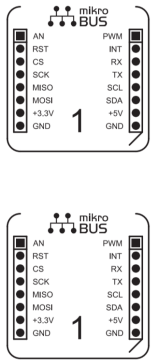


RF and Processor

File: RF.sch

Sheet: MikroBus Click

Estimated BOM cost: $0.15



MikroBus Headers

File: MikroBusClick.sch

Sheet: Sheet5D099F01

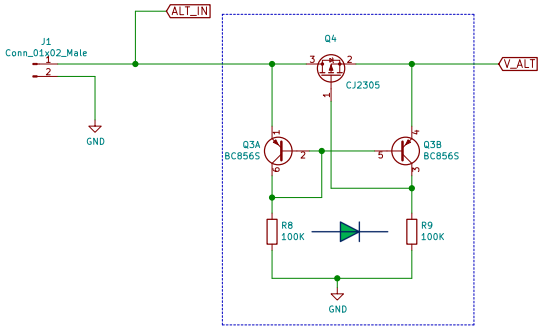
Estimated BOM cost: $0.03

Indicators

File: Indicators.sch

Schematic originally designed by Analog Life, LLC
Beagleboard.org

Sheet: /	
File: BeagleConnect Freedom.sch	
Title: BeagleConnect Leash	
Size: C	Date: 2020-08-31
KiCad E.D.A. kicad 5.1.5-52549c586ubuntu18.04.1	Rev: A
	Id: 1/10

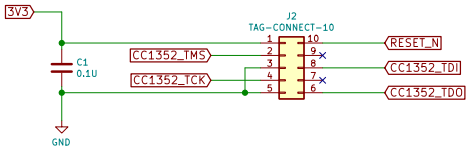


Schematic originally designed by Analog Life, LLC
Beagleboard.org

Sheet: /External Input/
File: ExternalInput.sch

Title: BeagleConnect Leash

Size: B	Date: 2020-08-31	**Rev: A**
KiCad E.D.A. kicad 5.1.5-52549c586ubuntu18.04.1		Id: 2/10

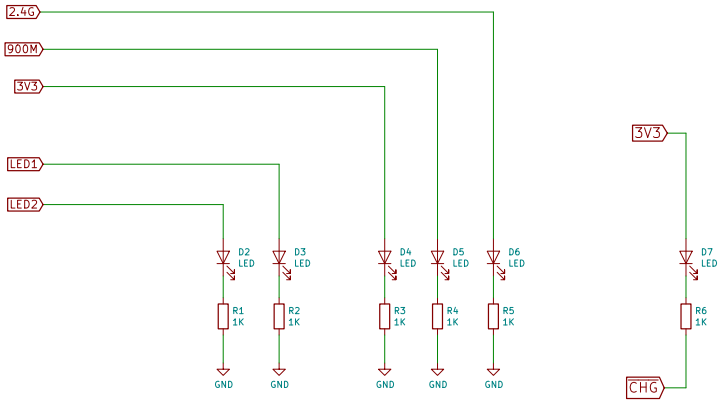


Schematic originally designed by Analog Life, LLC
Beagleboard.org

Sheet: /Programming/
File: Programming.sch

Title: BeagleConnect Leash

Size: B	Date: 2020-08-31	**Rev: A**
KiCad E.D.A. kicad 5.1.5-52549c586ubuntu18.04.1		Id: 3/10



Schematic originally designed by Analog Life, LLC

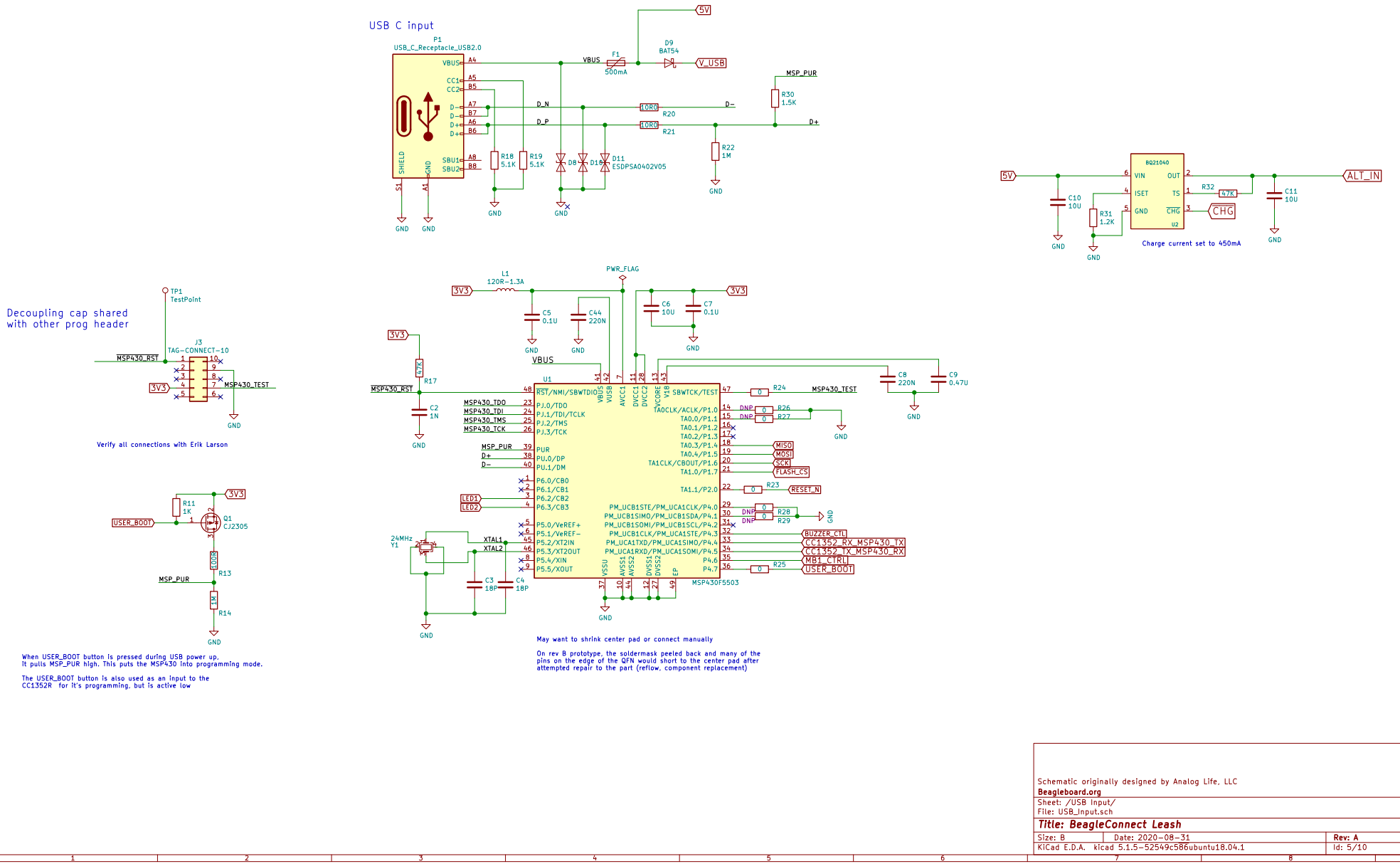
Beagleboard.org

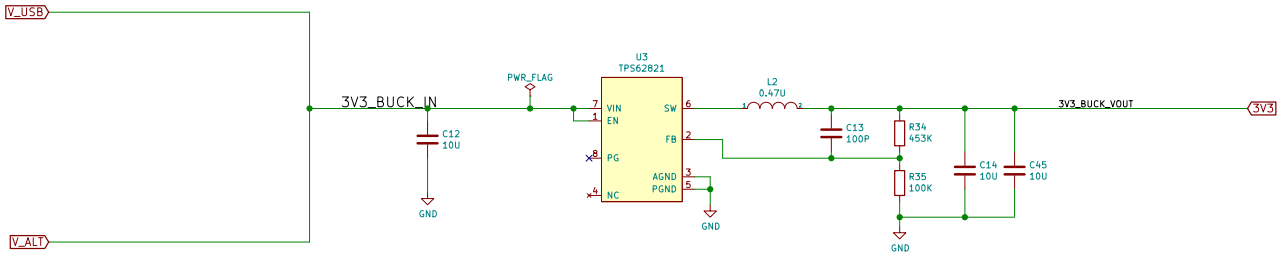
Sheet: /Sheet5D099F01/

File: Indicators.sch

Title: BeagleConnect Leash

Size: B	Date: 2020-08-31	**Rev: A**
KiCad E.D.A. kicad 5.1.5-52549c586ubuntu18.04.1		Id: 4/10


USB C input
P1
USB_C_Receptacle_USB2.0
VBUS
CC1
CC2
D-
D+
SBU1
SBU2
SHIELD
GND
S1
A1
A4
A5
B5
A7
B7
A6
B6
A8
B8
F1
500mA
D9
BAT54
5V
V_USB
D_N
D_P
1ORO
R20
R21
D-
D+
MSP_PUR
R30
1.5K
R22
1M
R18
5.1K
R19
5.1K
D8
D10
D11
ESDPSA0402V05
GND
BQ21040
VIN
OUT
ISET
TS
GND
CHG
U2
R31
1.2K
R32
47K
C10
10U
C11
10U
ALT_IN
CHG
Charge current set to 450mA
Decoupling cap shared
with other prog header
TP1
TestPoint
J3
TAG-CONNECT-10
MSP430_RST
MSP430_TEST
3V3
Verify all connections with Erik Larson
L1
120R-1.3A
PWR_FLAG
C5
0.1U
C44
220N
C6
10U
C7
0.1U
C8
220N
C9
0.47U
VBUS
R17
47K
C2
1N
U1
MSP430F5503
RST/NMI/SBWTDIO
PJ.0/TDO
PJ.1/TDI/TCLK
PJ.2/TMS
PJ.3/TCK
PUR
PU.0/DP
PU.1/DM
P6.0/CB0
P6.1/CB1
P6.2/CB2
P6.3/CB3
P5.0/VeREF+
P5.1/VeREF-
P5.2/XT2IN
P5.3/XT2OUT
P5.4/XIN
P5.5/XOUT
TA0CLK/ACLK/P1.0
TA0.0/P1.1
TA0.1/P1.2
TA0.2/P1.3
TA0.3/P1.4
TA0.4/P1.5
TA1CLK/CBOUT/P1.6
TA1.0/P1.7
TA1.1/P2.0
P4.6
P4.7
MSP430_TDO
MSP430_TDI
MSP430_TMS
MSP430_TCK
MSP_PUR
D+
D-
LED1
LED2
XTAL1
XTAL2
24MHz
Y1
C3
18P
C4
18P
R24
R26
R27
R23
R28
R29
R25
DNP
MISO
MOSI
SCK
FLASH_CS
RESET_N
BUZZER_CTL
CC1352_RX_MSP430_TX
CC1352_TX_MSP430_RX
MB1_CTRL
USER_BOOT
May want to shrink center pad or connect manually
On rev B prototype, the soldermask peeled back and many of the pins on the edge of the QFN would short to the center pad after attempted repair to the part (reflow, component replacement)
R11
1K
Q1
CJ2305
R13
100R
R14
1K
When USER_BOOT button is pressed during USB power up,
it pulls MSP_PUR high. This puts the MSP430 into programming mode.
The USER_BOOT button is also used as an input to the
CC1352R for it's programming, but is active low
Schematic originally designed by Analog Life, LLC
Beagleboard.org
Sheet: /USB Input/
File: USB_Input.sch
Title: BeagleConnect Leash
Size: B
Date: 2020-08-31
Rev: A
KiCad E.D.A. kicad 5.1.5-52549c586ubuntu18.04.1
Id: 5/10



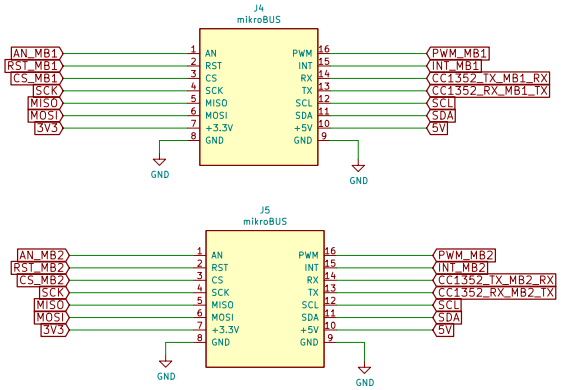
Schematic originally designed by Analog Life, LLC
Beagleboard.org
Sheet: /Boost Converters/
File: Boost.sch

Title: BeagleConnect Leash

Size: B	Date: 2020-08-31	**Rev: A**
KiCad E.D.A. kicad 5.1.5-52549c586ubuntu18.04.1		Id: 6/10

*Footprint is component footprint plus 1 mm per side.

Part	Manufacturer	Part Number	Quantity	Total Price ($)	Attribute	Total Footprint (mm²)	Top View	Edit
Cin	TDK	C1608X7S1A475K080AC	1	0.06	Cap = 4.7 µF Total Derated Cap = 1.5 µF VDC = 10 V ESR = 3.73 mΩ Package = 0603	4.68	-	SELECT ALTERNATE PART
L1	MuRata	DFE201610E-R47M=P2	1	0.15	L = 470 nH DCR = 26 mΩ IDC = 3.6 A	7.8		SELECT ALTERNATE PART
U1	Texas Instruments	TPS62821DLCR	1	0.47		7.5		
					Cap = 22 µF			



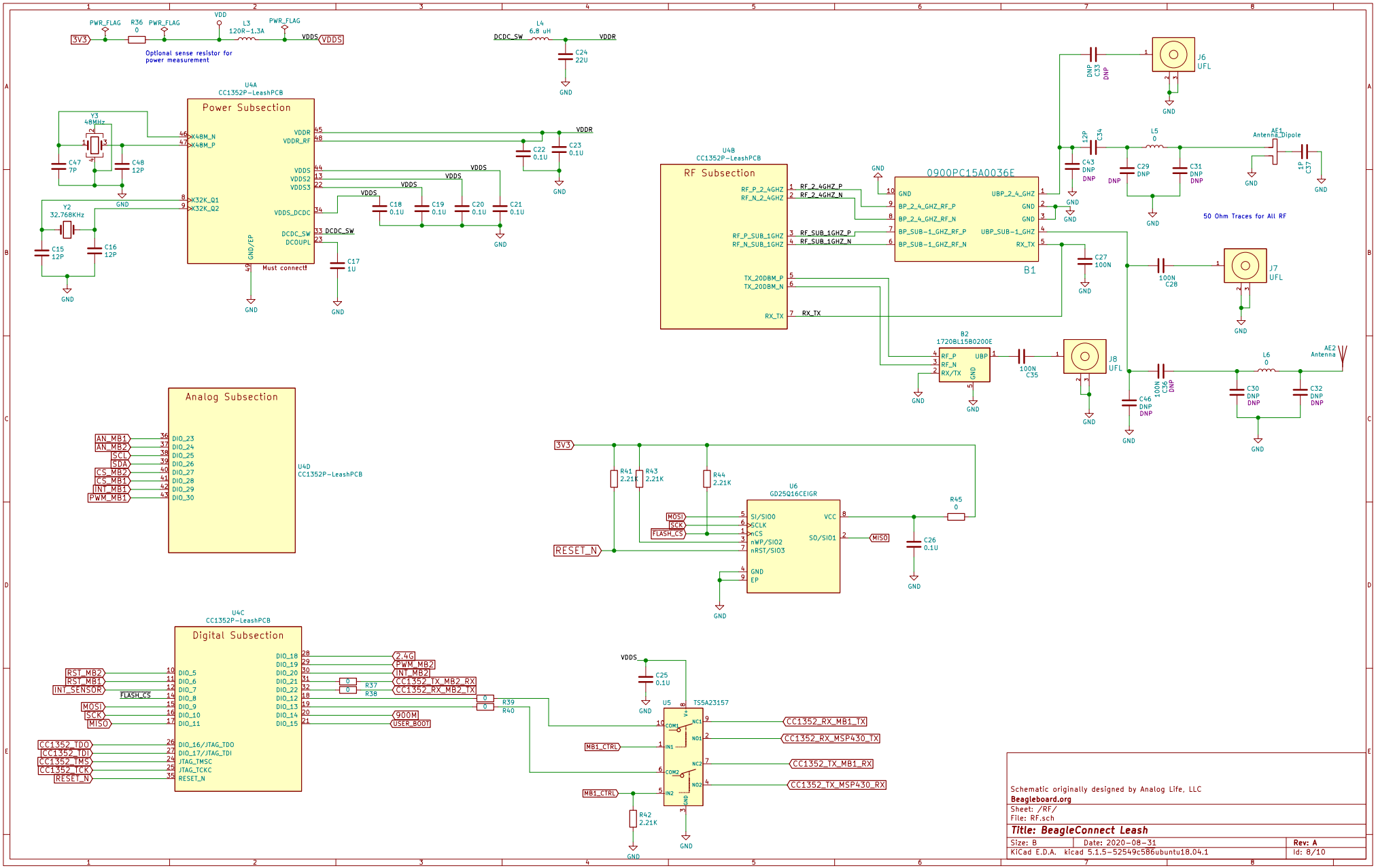
Schematic originally designed by Analog Life, LLC

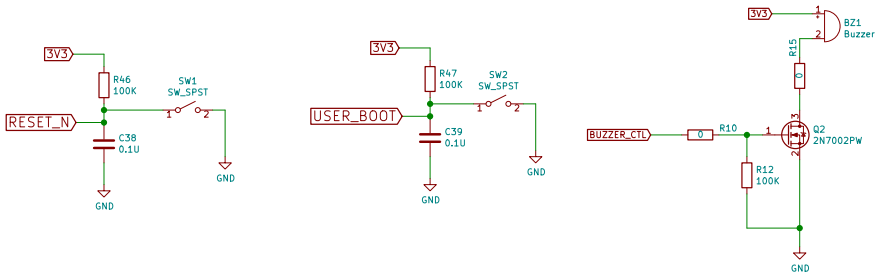
Beagleboard.org

Sheet: /MikroBus Click/
File: MikroBusClick.sch

Title: BeagleConnect Leash

Size: B	Date: 2020-08-31	**Rev: A**
KiCad E.D.A. kicad 5.1.5-52549c586ubuntu18.04.1		Id: 7/10


PWR_FLAG
R36
0
PWR_FLAG
VDD
L3
120R-1.3A
PWR_FLAG
3V3
VDDS
VDDS
Optional sense resistor for
power measurement
L4
6.8 uH
DCDC_SW
VDDR
C24
22U
GND
U4A
CC1352P-LeashPCB
Power Subsection
Y3
48MHz
C47
7P
C48
12P
X48M_N
X48M_P
Y2
32.768KHz
C15
12P
C16
12P
X32K_Q1
X32K_Q2
GND
VDDR
VDDR_RF
C22
0.1U
C23
0.1U
VDDS
VDDS2
VDDS3
VDDS_DCDC
C18
0.1U
C19
0.1U
C20
0.1U
C21
0.1U
DCDC_SW
DCOUPL
C17
1U
GND/EP
Must connect!
U4B
CC1352P-LeashPCB
RF Subsection
RF_P_2_4GHZ
RF_N_2_4GHZ
RF_P_SUB_1GHZ
RF_N_SUB_1GHZ
TX_20DBM_P
TX_20DBM_N
RX_TX
RF_2_4GHZ_P
RF_2_4GHZ_N
RF_SUB_1GHZ_P
RF_SUB_1GHZ_N
RX_TX
0900PC15A0036E
GND
BP_2_4_GHZ_RF_P
BP_2_4_GHZ_RF_N
BP_SUB-1_GHZ_RF_P
BP_SUB-1_GHZ_RF_N
UBP_2_4_GHZ
UBP_SUB-1_GHZ
RX_TX
B1
DNP
C33
DNP
J6
UFL
12P
C34
C43
DNP
DNP
L5
0
C29
DNP
DNP
C31
DNP
DNP
AE1
Antenna_Dipole
1P
C37
50 Ohm Traces for All RF
C27
100N
100N
C28
J7
UFL
B2
1720BL15B0200E
RF_P
RF_N
RX/TX
UBP
GND
100N
C35
J8
UFL
100N
C36
DNP
C46
DNP
DNP
L6
0
AE2
Antenna
C30
DNP
DNP
C32
DNP
DNP
Analog Subsection
U4D
CC1352P-LeashPCB
AN_MB1
AN_MB2
SCL
SDA
CS_MB2
CS_MB1
INT_MB1
PWM_MB1
DIO_23
DIO_24
DIO_25
DIO_26
DIO_27
DIO_28
DIO_29
DIO_30
3V3
R41
2.21K
R43
2.21K
R44
2.21K
U6
GD25Q16CEIGR
MOSI
SCK
FLASH_CS
RESET_N
SI/SIO0
SCLK
nCS
nWP/SIO2
nRST/SIO3
GND
EP
VCC
SO/SIO1
MISO
R45
0
C26
0.1U
U4C
CC1352P-LeashPCB
Digital Subsection
RST_MB2
RST_MB1
INT_SENSOR
FLASH_CS
MOSI
SCK
MISO
CC1352_TDO
CC1352_TDI
CC1352_TMS
CC1352_TCK
RESET_N
DIO_5
DIO_6
DIO_7
DIO_8
DIO_9
DIO_10
DIO_11
DIO_16/JTAG_TDO
DIO_17/JTAG_TDI
JTAG_TMSC
JTAG_TCKC
RESET_N
DIO_18
DIO_19
DIO_20
DIO_21
DIO_22
DIO_12
DIO_13
DIO_14
DIO_15
2.4G
PWM_MB2
INT_MB2
CC1352_TX_MB2_RX
CC1352_RX_MB2_TX
900M
USER_BOOT
R37
R38
R39
R40
VDDS
C25
0.1U
U5
TS5A23157
MB1_CTRL
COM1
COM2
IN1
IN2
NC1
NO1
NC2
NO2
V+
GND
CC1352_RX_MB1_TX
CC1352_RX_MSP430_TX
CC1352_TX_MB1_RX
CC1352_TX_MSP430_RX
R42
2.21K
Schematic originally designed by Analog Life, LLC
Beagleboard.org
Sheet: /RF/
File: RF.sch
Title: BeagleConnect Leash
Size: B
Date: 2020-08-31
Rev: A
KiCad E.D.A. kicad 5.1.5-52549c586ubuntu18.04.1
Id: 8/10

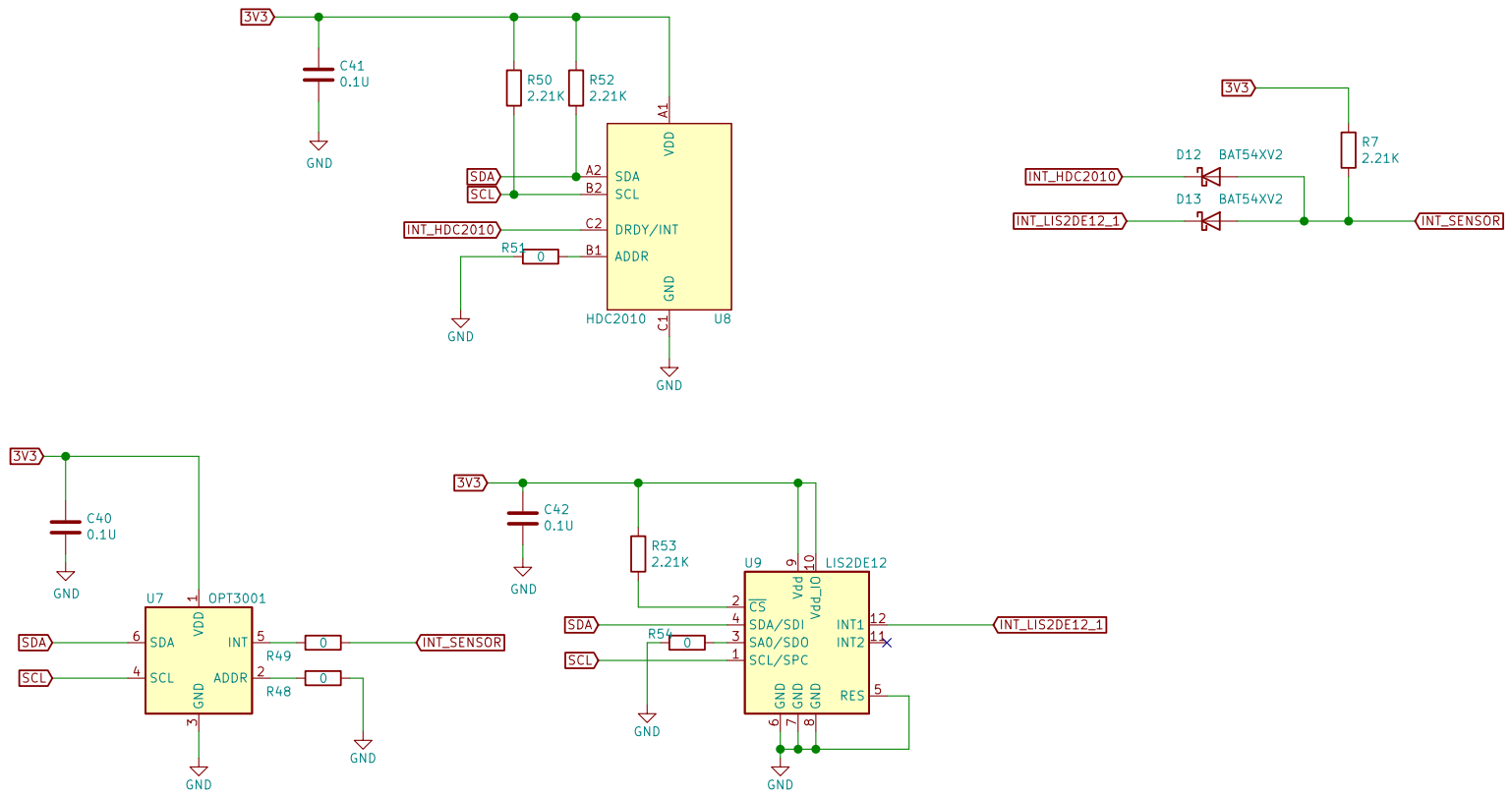


Schematic originally designed by Analog Life, LLC
Beagleboard.org

Sheet: /User Input/Output/
File: UserInputOutput.sch

Title: BeagleConnect Leash

Size: B	Date: 2020-08-31	**Rev: A**
KiCad E.D.A. kicad 5.1.5-52549c586ubuntu18.04.1		Id: 9/10



Schematic originally designed by Analog Life, LLC

Sheet: /Sensors/
File: Sensors.sch

Title: BeagleConnect Leash

Size: A4	Date: 2020-08-31	**Rev: A**
KiCad E.D.A. kicad 5.1.5-52549c586ubuntu18.04.1		Id: 10/10