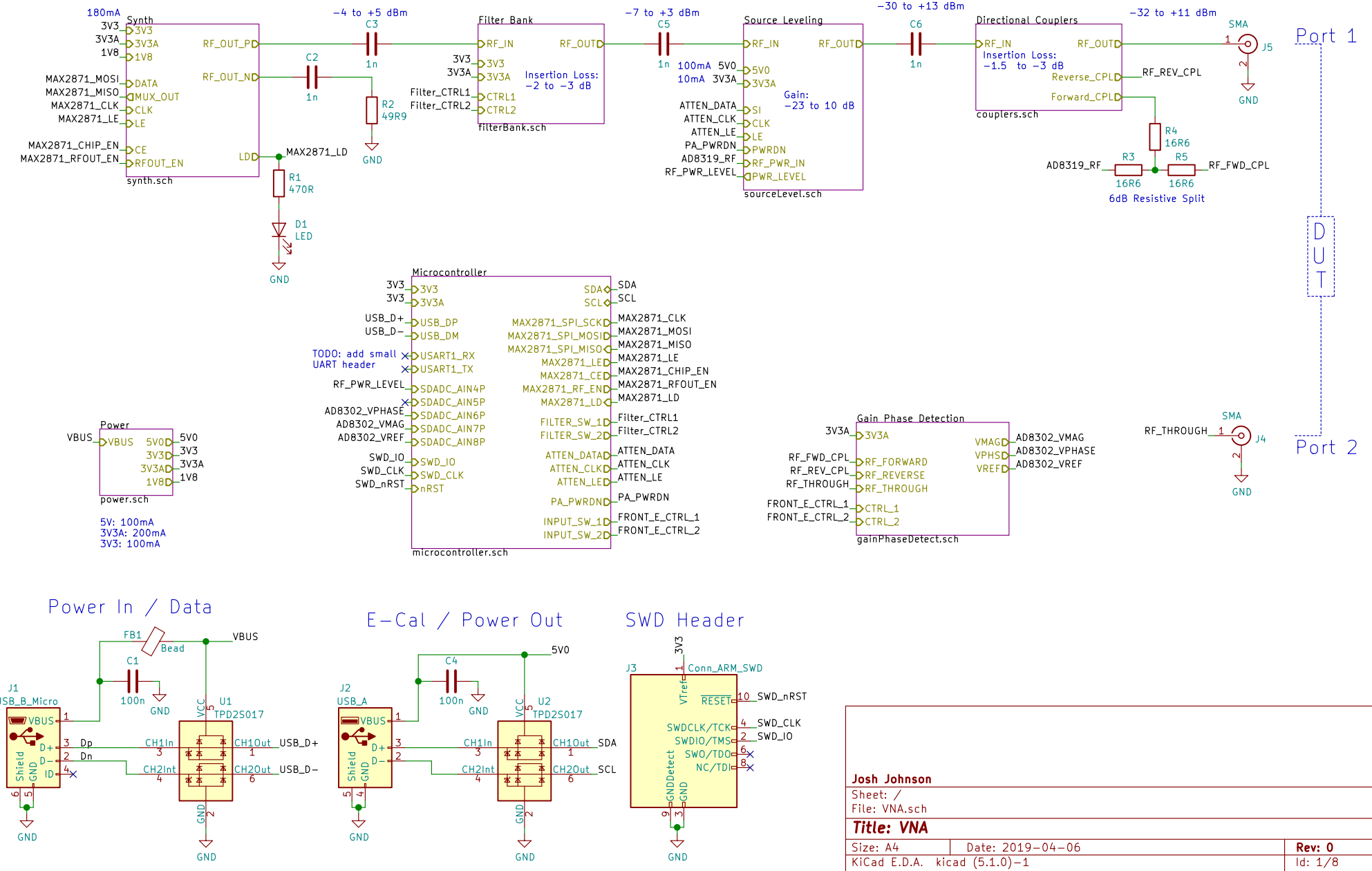
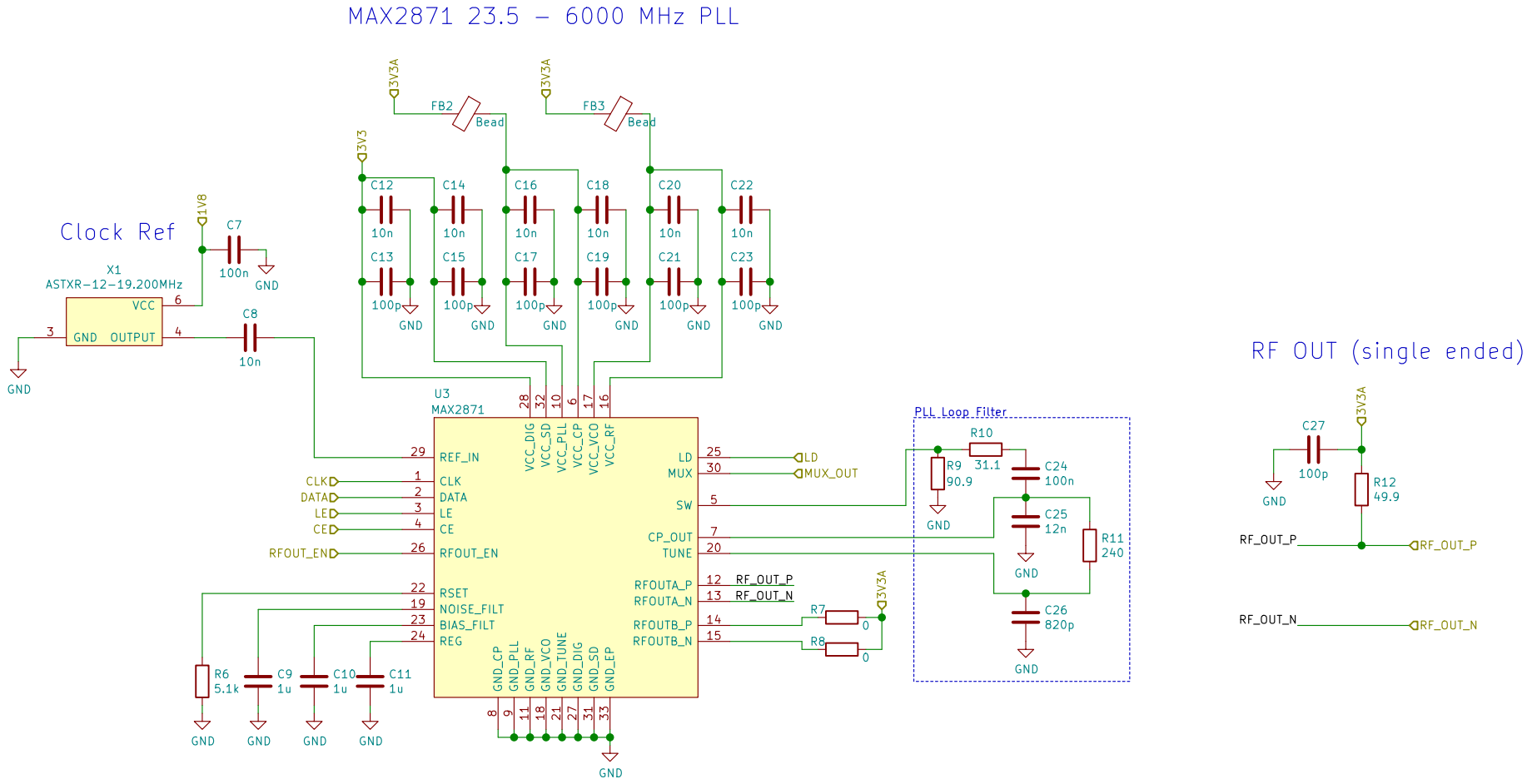
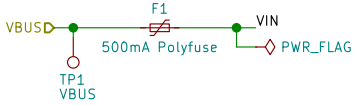
Josh's VNA


180mA
Synth
3V3
3V3A
1V8
MAX2871_MOSI
MAX2871_MISO
MAX2871_CLK
MAX2871_LE
MAX2871_CHIP_EN
MAX2871_RFOUT_EN
DATA
MUX_OUT
CLK
LE
CE
RFOUT_EN
RF_OUT_P
RF_OUT_N
LD
synth.sch
C2
1n
C3
1n
−4 to +5 dBm
R2
49R9
GND
MAX2871_LD
R1
470R
D1
LED
GND
Filter Bank
RF_IN
RF_OUT
3V3
3V3A
Filter_CTRL1
Filter_CTRL2
CTRL1
CTRL2
Insertion Loss:
−2 to −3 dB
filterBank.sch
C5
1n
−7 to +3 dBm
Source Leveling
RF_IN
RF_OUT
100mA 5V0
10mA 3V3A
5V0
3V3A
ATTEN_DATA
ATTEN_CLK
ATTEN_LE
PA_PWRDN
AD8319_RF
RF_PWR_LEVEL
SI
CLK
LE
PWRDN
RF_PWR_IN
PWR_LEVEL
Gain:
−23 to 10 dB
sourceLevel.sch
C6
1n
−30 to +13 dBm
Directional Couplers
RF_IN
RF_OUT
Insertion Loss:
−1.5 to −3 dB
Reverse_CPL
Forward_CPL
couplers.sch
−32 to +11 dBm
SMA
J5
GND
RF_REV_CPL
R4
16R6
R3
16R6
R5
16R6
AD8319_RF
RF_FWD_CPL
6dB Resistive Split
Port 1
D
U
T
Port 2
Microcontroller
3V3
3V3A
USB_D+
USB_D−
USB_DP
USB_DM
TODO: add small
UART header
USART1_RX
USART1_TX
RF_PWR_LEVEL
SDADC_AIN4P
SDADC_AIN5P
AD8302_VPHASE
AD8302_VMAG
AD8302_VREF
SDADC_AIN6P
SDADC_AIN7P
SDADC_AIN8P
SWD_IO
SWD_CLK
SWD_nRST
nRST
SDA
SCL
MAX2871_SPI_SCK
MAX2871_SPI_MOSI
MAX2871_SPI_MISO
MAX2871_LE
MAX2871_CE
MAX2871_RF_EN
MAX2871_LD
FILTER_SW_1
FILTER_SW_2
ATTEN_DATA
ATTEN_CLK
ATTEN_LE
PA_PWRDN
INPUT_SW_1
INPUT_SW_2
MAX2871_CLK
MAX2871_MOSI
MAX2871_MISO
MAX2871_LE
MAX2871_CHIP_EN
MAX2871_RFOUT_EN
MAX2871_LD
Filter_CTRL1
Filter_CTRL2
ATTEN_DATA
ATTEN_CLK
ATTEN_LE
PA_PWRDN
FRONT_E_CTRL_1
FRONT_E_CTRL_2
microcontroller.sch
Power
VBUS
5V0
3V3
3V3A
1V8
power.sch
5V: 100mA
3V3A: 200mA
3V3: 100mA
Gain Phase Detection
3V3A
RF_FWD_CPL
RF_REV_CPL
RF_THROUGH
FRONT_E_CTRL_1
FRONT_E_CTRL_2
RF_FORWARD
RF_REVERSE
RF_THROUGH
CTRL_1
CTRL_2
VMAG
VPHS
VREF
AD8302_VMAG
AD8302_VPHASE
AD8302_VREF
gainPhaseDetect.sch
RF_THROUGH
SMA
J4
GND
Power In / Data
J1
USB_B_Micro
VBUS
D+
D−
ID
Shield
GND
Dp
Dn
FB1
Bead
C1
100n
U1
TPD2S017
VCC
CH1In
CH2In
CH1Out
CH2Out
USB_D+
USB_D−
E−Cal / Power Out
J2
USB_A
C4
100n
5V0
U2
TPD2S017
SDA
SCL
SWD Header
J3
Conn_ARM_SWD
3V3
VTref
RESET
SWD_nRST
SWDCLK/TCK
SWDIO/TMS
SWO/TDO
NC/TDI
SWD_CLK
SWD_IO
GNDDetect
Josh Johnson
Sheet: /
File: VNA.sch
Title: VNA
Size: A4
Date: 2019−04−06
Rev: 0
KiCad E.D.A. kicad (5.1.0)−1
Id: 1/8

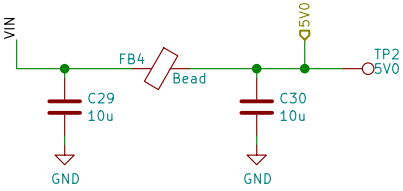


Josh Johnson		
Sheet: /Synth/		
File: synth.sch		
Title: Synth		
Size: A4	Date: 2019-04-06	**Rev: 0**
KiCad E.D.A. kicad (5.1.0)-1		Id: 2/8

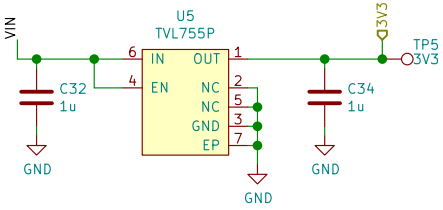
Input Protection



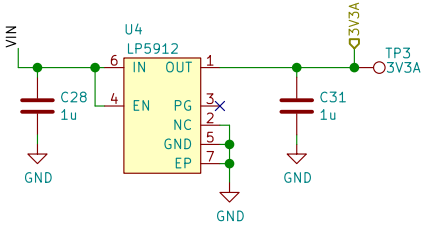
5V (Filtered)



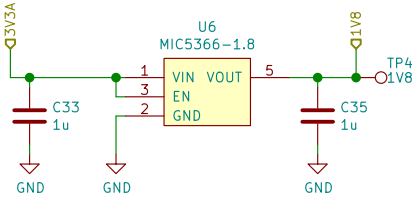
3V3 LDO



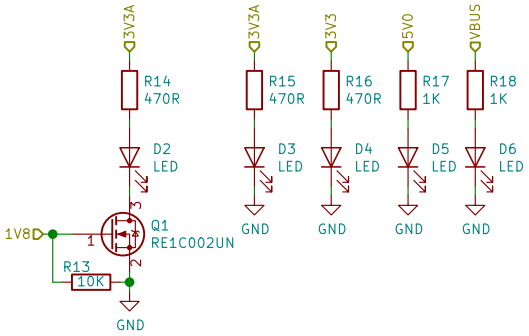
3V3A LDO



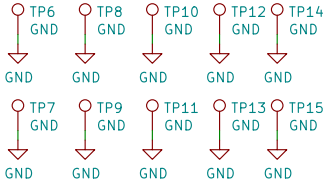
1V8 LDO



Voltage Rail LEDs



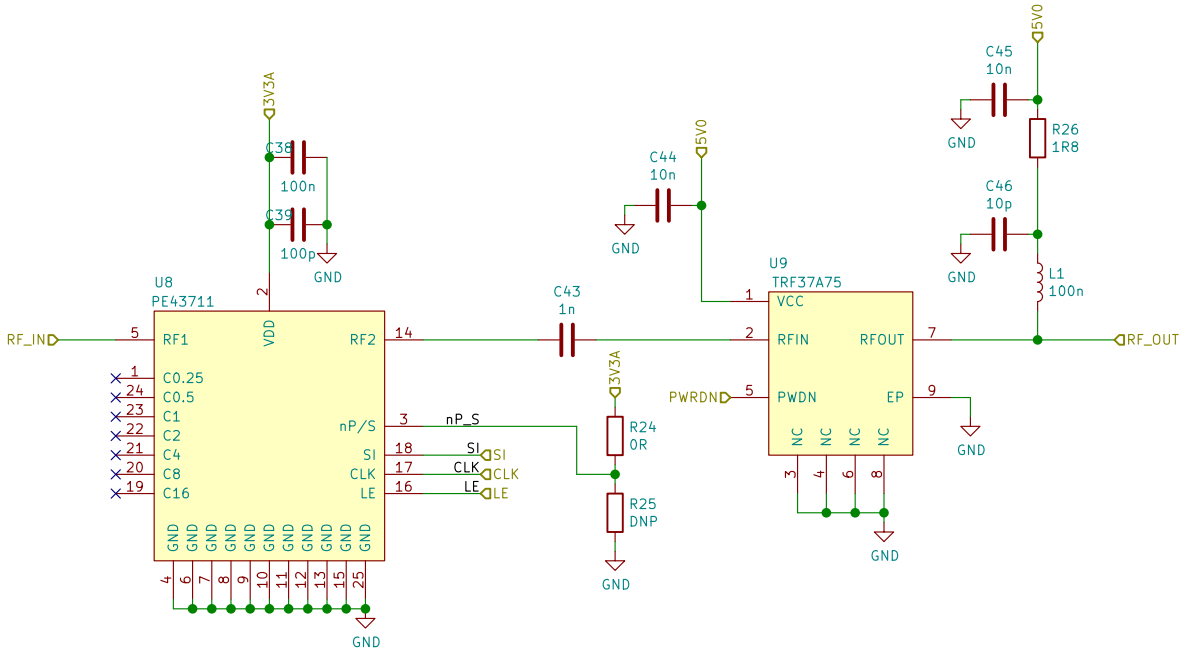
Ground Test Points



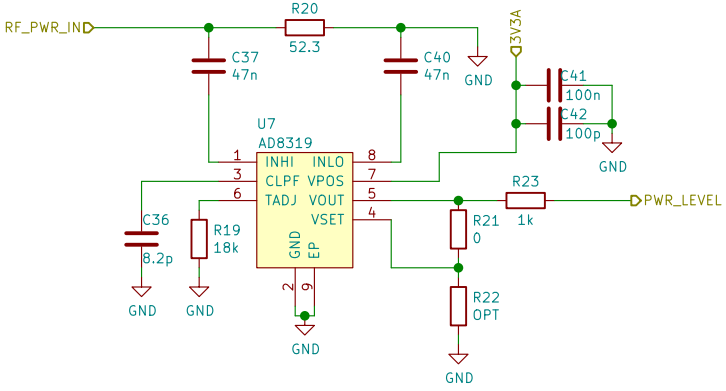
Josh Johnson		
Sheet: /Power/		
File: power.sch		
Title: Power		
Size: A4	Date: 2019-04-06	**Rev: 0**
KiCad E.D.A. kicad (5.1.0)-1		Id: 3/8

Programmable Attenuator

Amplifier
(Gain = 12dB P1dB = +18dBm IP3 = +32.5dBm)



Power Detector

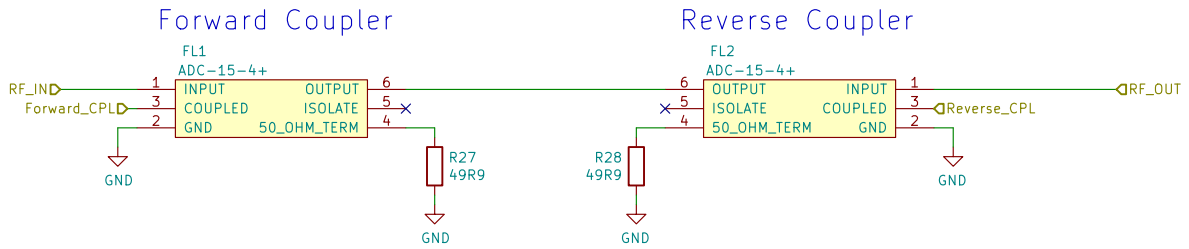


Josh Johnson

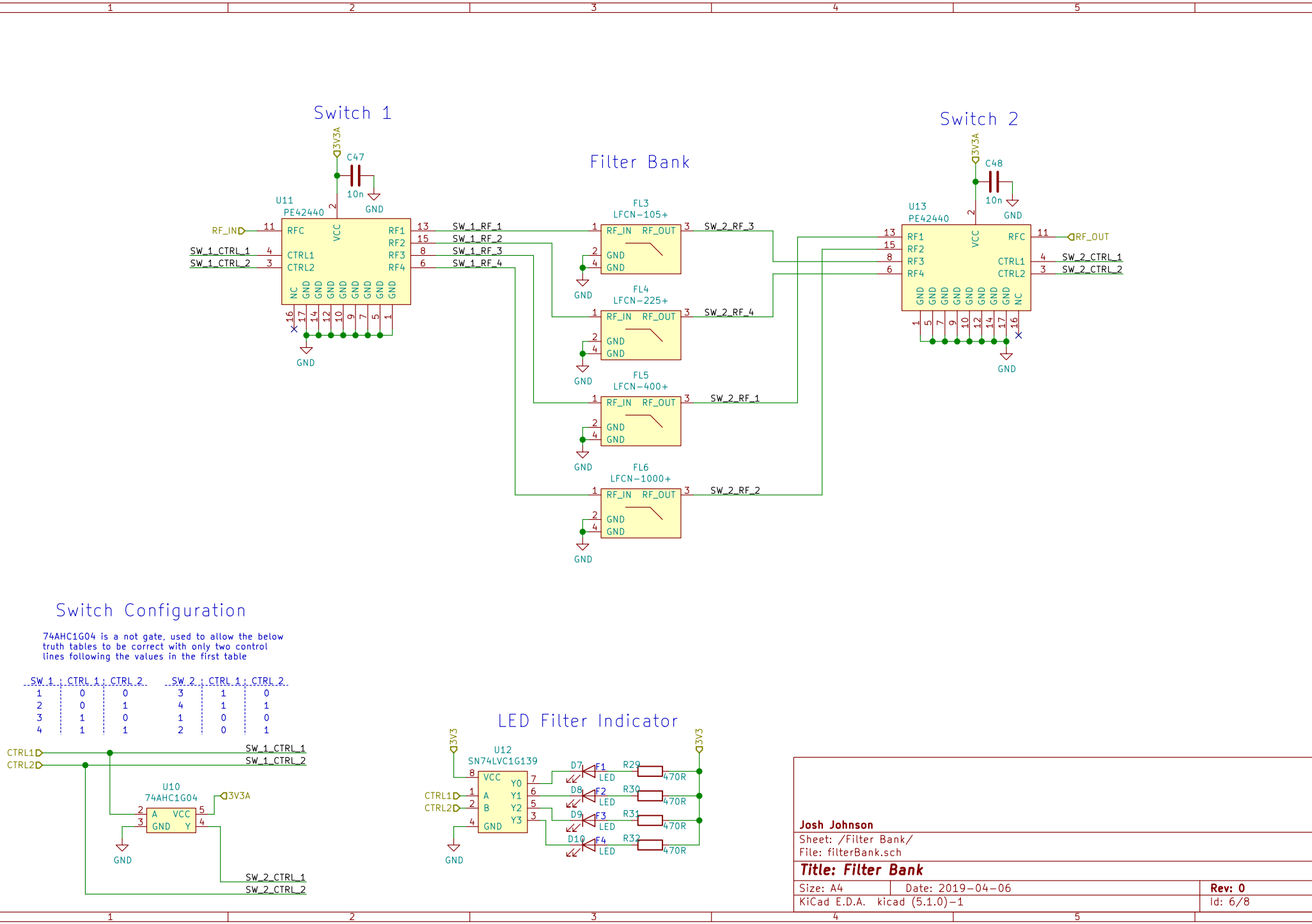
Sheet: /Source Leveling/
File: sourceLevel.sch

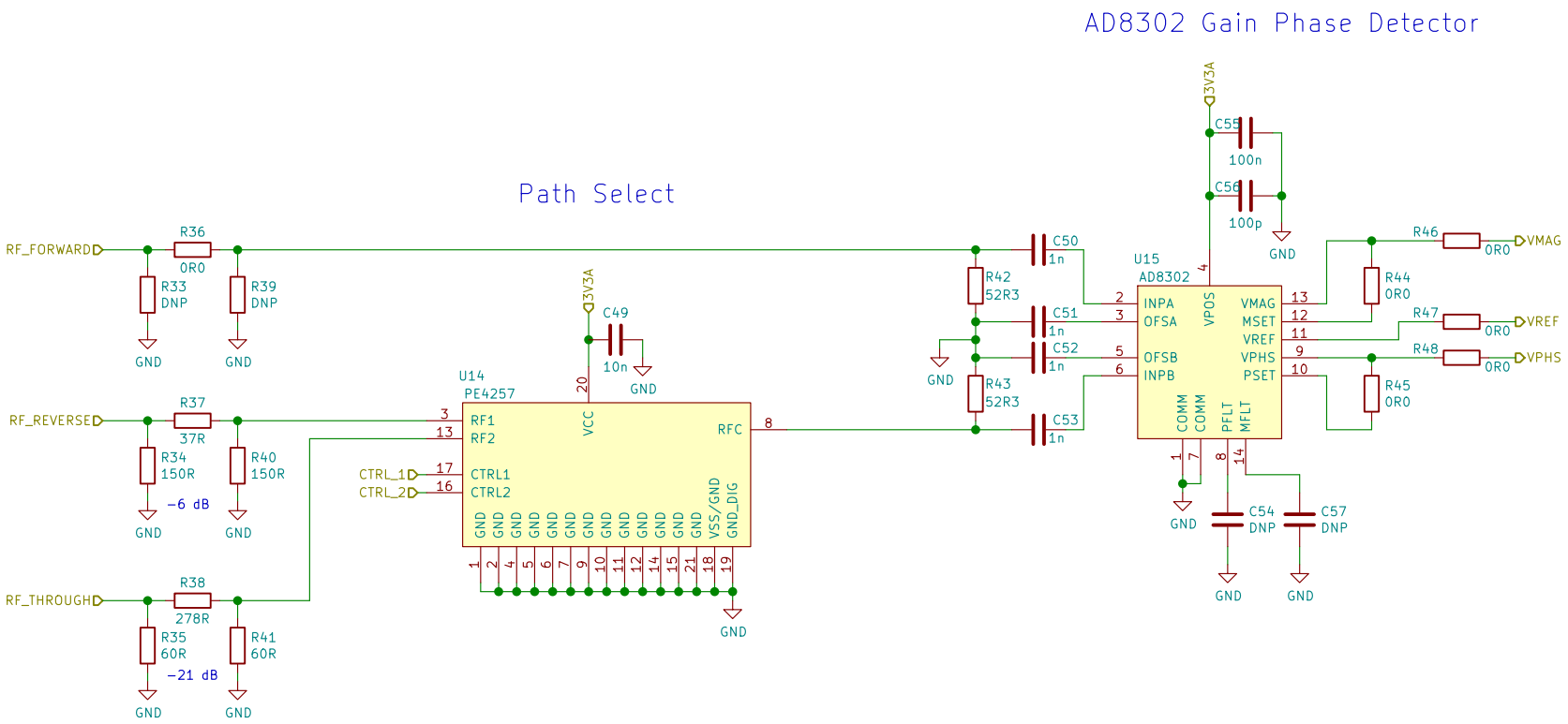
Title: Source Leveling

Size: A4	Date: 2019-04-06	**Rev: 0**
KiCad E.D.A. kicad (5.1.0)-1		Id: 4/8

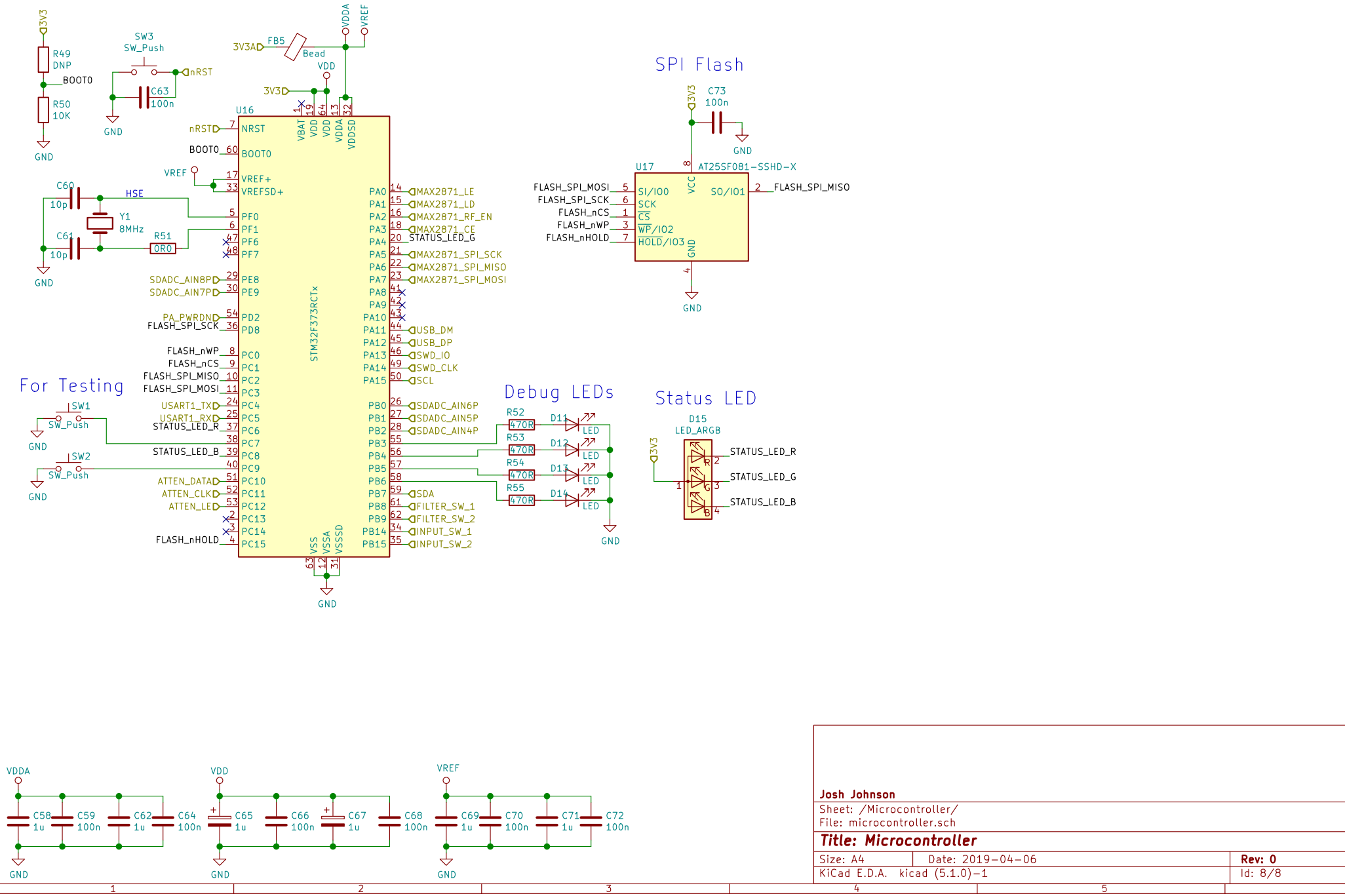


Josh Johnson		
Sheet: /Directional Couplers/ File: couplers.sch		
Title: Directional Couplers		
Size: A4	Date: 2019-04-06	**Rev: 0**
KiCad E.D.A. kicad (5.1.0)-1		Id: 5/8


Switch 1
Filter Bank
Switch 2
3V3A
C47
10n
GND
U11
PE42440
RF_IN
SW_1_CTRL_1
SW_1_CTRL_2
RFC
VCC
RF1
RF2
RF3
RF4
CTRL1
CTRL2
NC
SW_1_RF_1
SW_1_RF_2
SW_1_RF_3
SW_1_RF_4
FL3
LFCN-105+
FL4
LFCN-225+
FL5
LFCN-400+
FL6
LFCN-1000+
RF_IN
RF_OUT
SW_2_RF_3
SW_2_RF_4
SW_2_RF_1
SW_2_RF_2
C48
U13
PE42440
RF_OUT
SW_2_CTRL_1
SW_2_CTRL_2
Switch Configuration
74AHC1G04 is a not gate, used to allow the below
truth tables to be correct with only two control
lines following the values in the first table
SW 1 | CTRL 1 | CTRL 2
1 | 0 | 0
2 | 0 | 1
3 | 1 | 0
4 | 1 | 1
SW 2 | CTRL 1 | CTRL 2
3 | 1 | 0
4 | 1 | 1
1 | 0 | 0
2 | 0 | 1
CTRL1
CTRL2
SW_1_CTRL_1
SW_1_CTRL_2
U10
74AHC1G04
A
GND
VCC
Y
SW_2_CTRL_1
SW_2_CTRL_2
LED Filter Indicator
3V3
U12
SN74LVC1G139
VCC
GND
A
B
Y0
Y1
Y2
Y3
D7
D8
D9
D10
F1
F2
F3
F4
LED
R29
R30
R31
R32
470R
Josh Johnson
Sheet: /Filter Bank/
File: filterBank.sch
Title: Filter Bank
Size: A4
Date: 2019-04-06
Rev: 0
KiCad E.D.A. kicad (5.1.0)-1
Id: 6/8



Josh Johnson		
Sheet: /Gain Phase Detection/		
File: gainPhaseDetect.sch		
Title: Gain Phase Detector		
Size: A4	Date: 2019-04-06	**Rev: 0**
KiCad E.D.A. kicad (5.1.0)-1		Id: 7/8



Josh Johnson		
Sheet: /Microcontroller/		
File: microcontroller.sch		
Title: Microcontroller		
Size: A4	Date: 2019-04-06	**Rev: 0**
KiCad E.D.A. kicad (5.1.0)-1		Id: 8/8