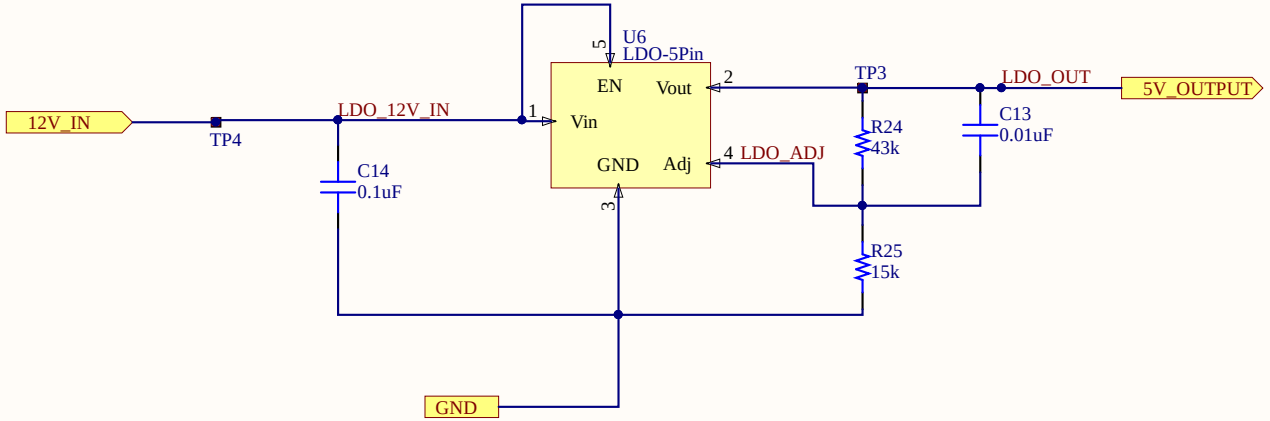
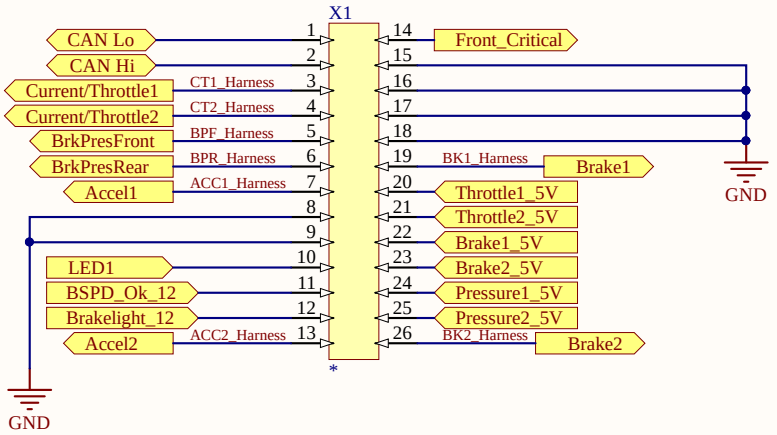
Takes the 12V input and converts it to 5V output using an LDO.

Degrees Celsius rise = 105 * current (A)

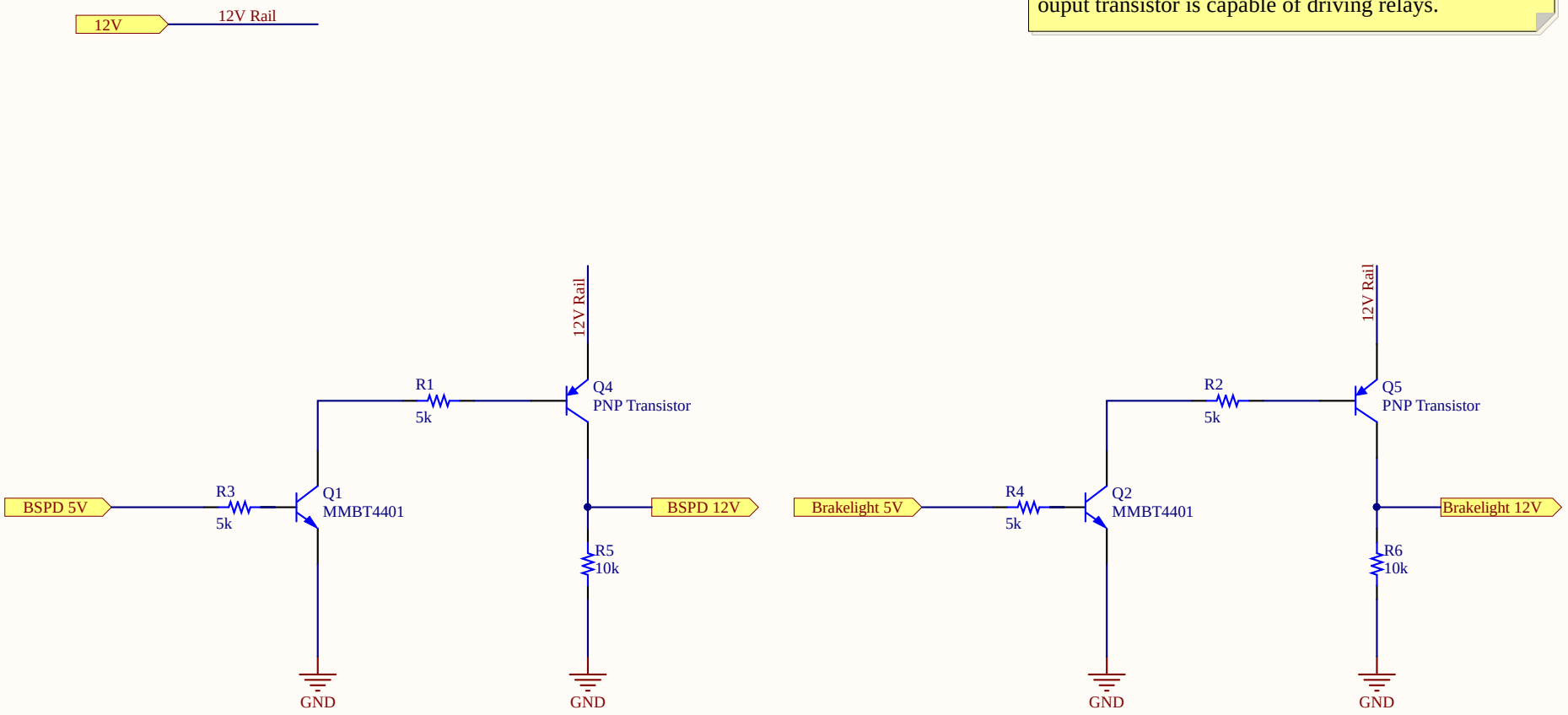


Title	**12V_to_5V_Converter**	
Size: A	Number:	Revision:
Date: 12/20/2019	Sheet of	
File: C:\Users\..\12V_to_5V_LDO_1A.SchDoc	Drawn By:	

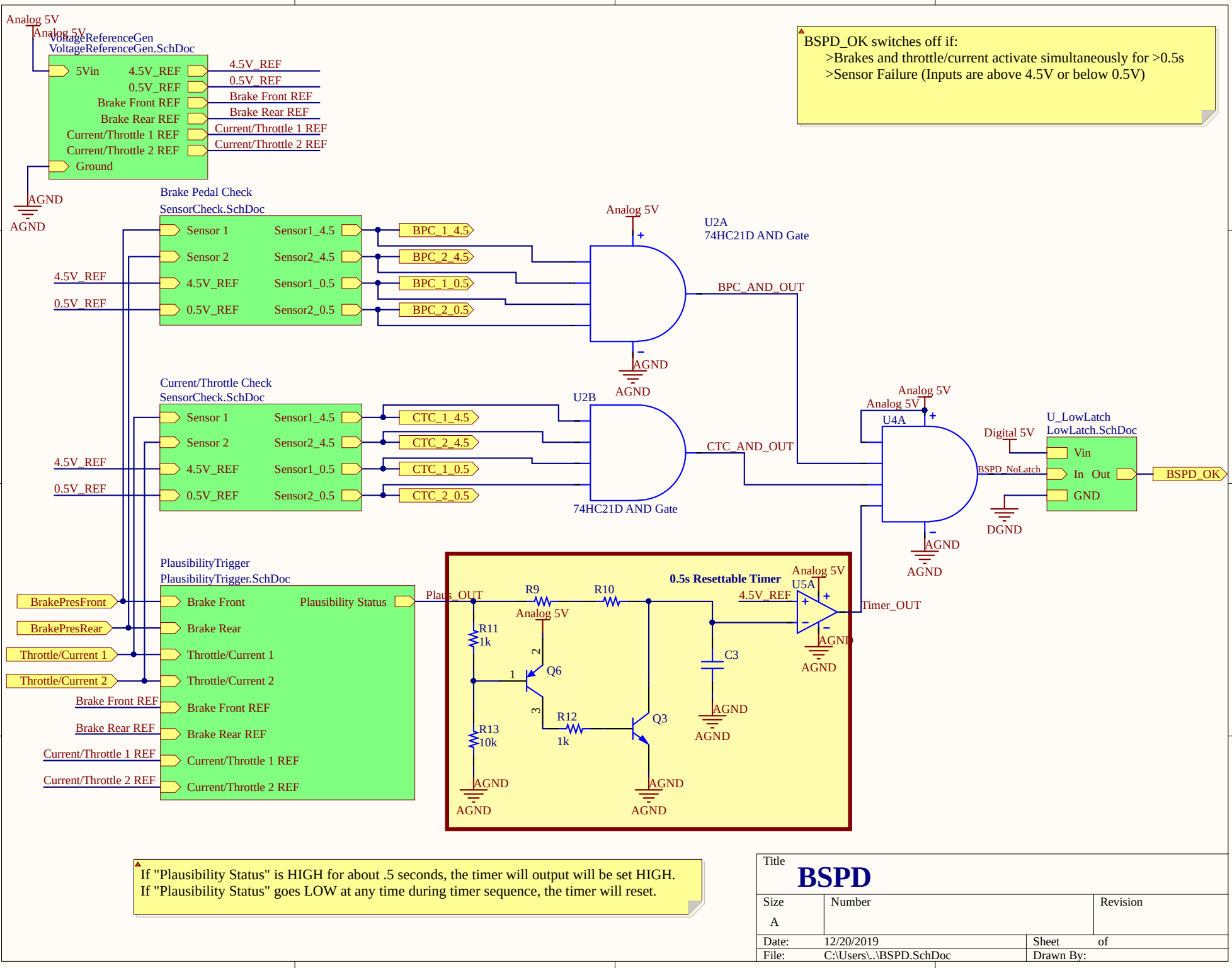


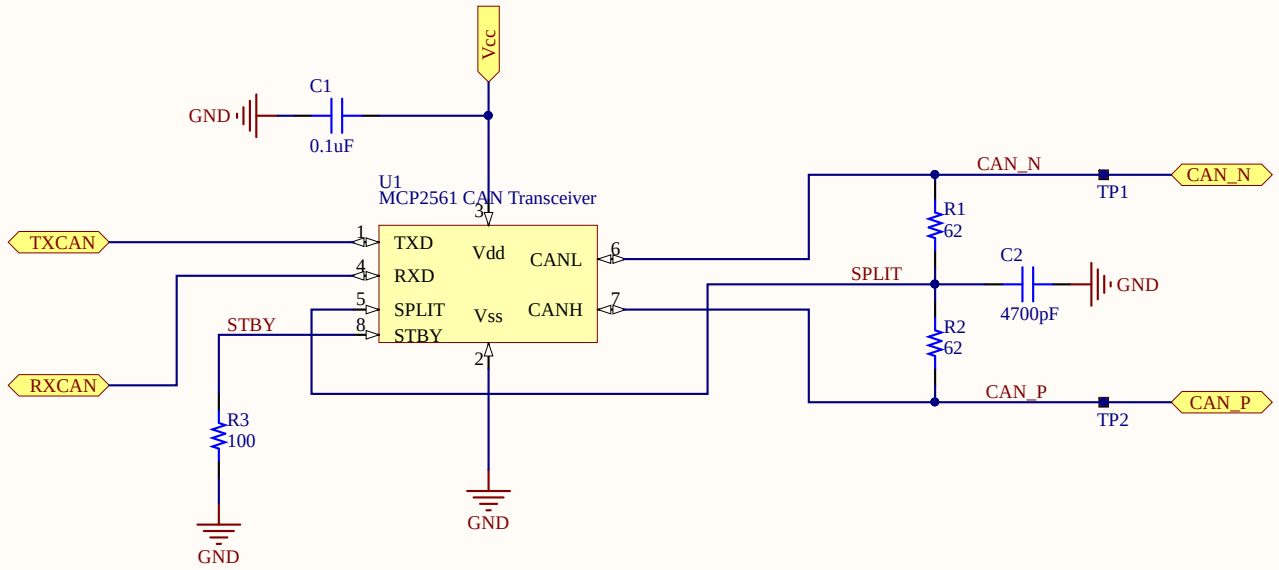
Title	**Pedalbox Superseal**	
Size: A	Number:	Revision:
Date: 12/20/2019		Sheet of
File: C:\Users\..\26PinSuperseal.SchDoc		Drawn By:

This circuit takes a 5V logic signal input and outputs a 12V signal that follows the input. Additionally, the ouput transistor is capable of driving relays.



Title	5V_12V_Logic	
Size: A	Number:	Revision:
Date: 12/20/2019		Sheet of
File: C:\Users\..\5V_12V_Logic.SchDoc		Drawn By:

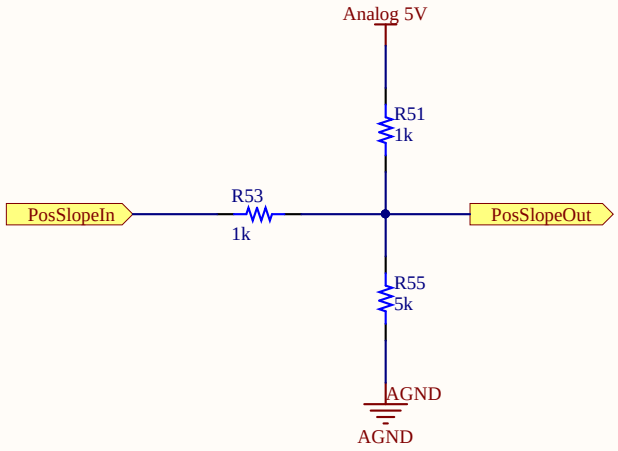

Analog 5V
Analog 5V
VoltageReferenceGen
VoltageReferenceGen.SchDoc
5Vin
4.5V_REF
0.5V_REF
Brake Front REF
Brake Rear REF
Current/Throttle 1 REF
Current/Throttle 2 REF
Ground
4.5V_REF
0.5V_REF
Brake Front REF
Brake Rear REF
Current/Throttle 1 REF
Current/Throttle 2 REF
AGND
AGND
BSPD_OK switches off if:
>Brakes and throttle/current activate simultaneously for >0.5s
>Sensor Failure (Inputs are above 4.5V or below 0.5V)
Brake Pedal Check
SensorCheck.SchDoc
Sensor 1
Sensor 2
4.5V_REF
0.5V_REF
Sensor1_4.5
Sensor2_4.5
Sensor1_0.5
Sensor2_0.5
BPC_1_4.5
BPC_2_4.5
BPC_1_0.5
BPC_2_0.5
4.5V_REF
0.5V_REF
Analog 5V
U2A
74HC21D AND Gate
BPC_AND_OUT
AGND
AGND
Current/Throttle Check
SensorCheck.SchDoc
Sensor 1
Sensor 2
4.5V_REF
0.5V_REF
Sensor1_4.5
Sensor2_4.5
Sensor1_0.5
Sensor2_0.5
CTC_1_4.5
CTC_2_4.5
CTC_1_0.5
CTC_2_0.5
4.5V_REF
0.5V_REF
U2B
74HC21D AND Gate
CTC_AND_OUT
Analog 5V
Analog 5V
U4A
AGND
AGND
Digital 5V
U_LowLatch
LowLatch.SchDoc
Vin
In
Out
GND
BSPD_NoLatch
BSPD_OK
DGND
PlausibilityTrigger
PlausibilityTrigger.SchDoc
Brake Front
Brake Rear
Throttle/Current 1
Throttle/Current 2
Brake Front REF
Brake Rear REF
Current/Throttle 1 REF
Current/Throttle 2 REF
Plausibility Status
BrakePresFront
BrakePresRear
Throttle/Current 1
Throttle/Current 2
Brake Front REF
Brake Rear REF
Current/Throttle 1 REF
Current/Throttle 2 REF
Plaus_OUT
0.5s Resettable Timer
R9
R10
Analog 5V
R11
1k
Q6
R13
10k
R12
1k
Q3
C3
AGND
AGND
AGND
AGND
AGND
Analog 5V
U5A
4.5V_REF
Timer_OUT
AGND
AGND
If "Plausibility Status" is HIGH for about .5 seconds, the timer will output will be set HIGH.
If "Plausibility Status" goes LOW at any time during timer sequence, the timer will reset.
Title
BSPD
Size
A
Number
Revision
Date:
12/20/2019
Sheet
of
File:
C:\Users\..\BSPD.SchDoc
Drawn By:

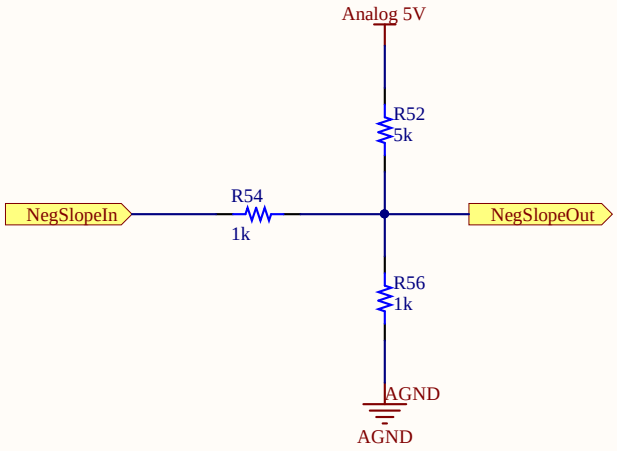


Title		
Size: A	Number	Revision
Date: 12/20/2019		Sheet of
File: C:\Users\..\CAN_5V.SchDoc		Drawn By:

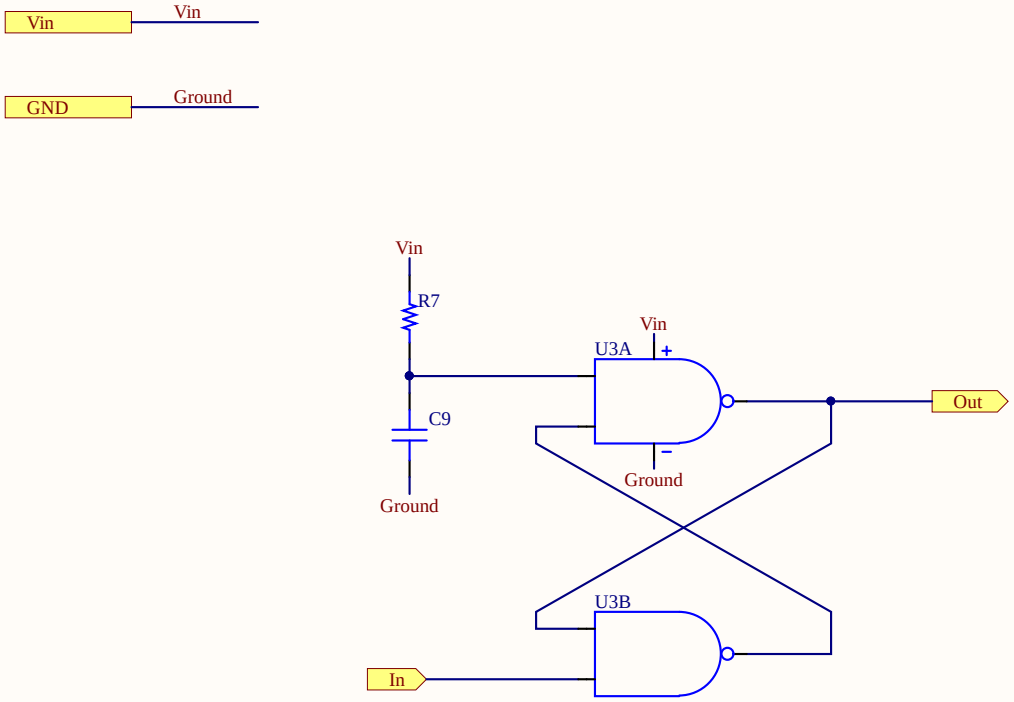
This passive Circuitry takes signals from sensors with inverted voltage slopes that cross at their midpoints, and will offset them such that they only cross at the beginning of their slopes

To bypass circuit:
Place a 0-ohm jumper in the input resistor position.
Omit resistors from other positions.

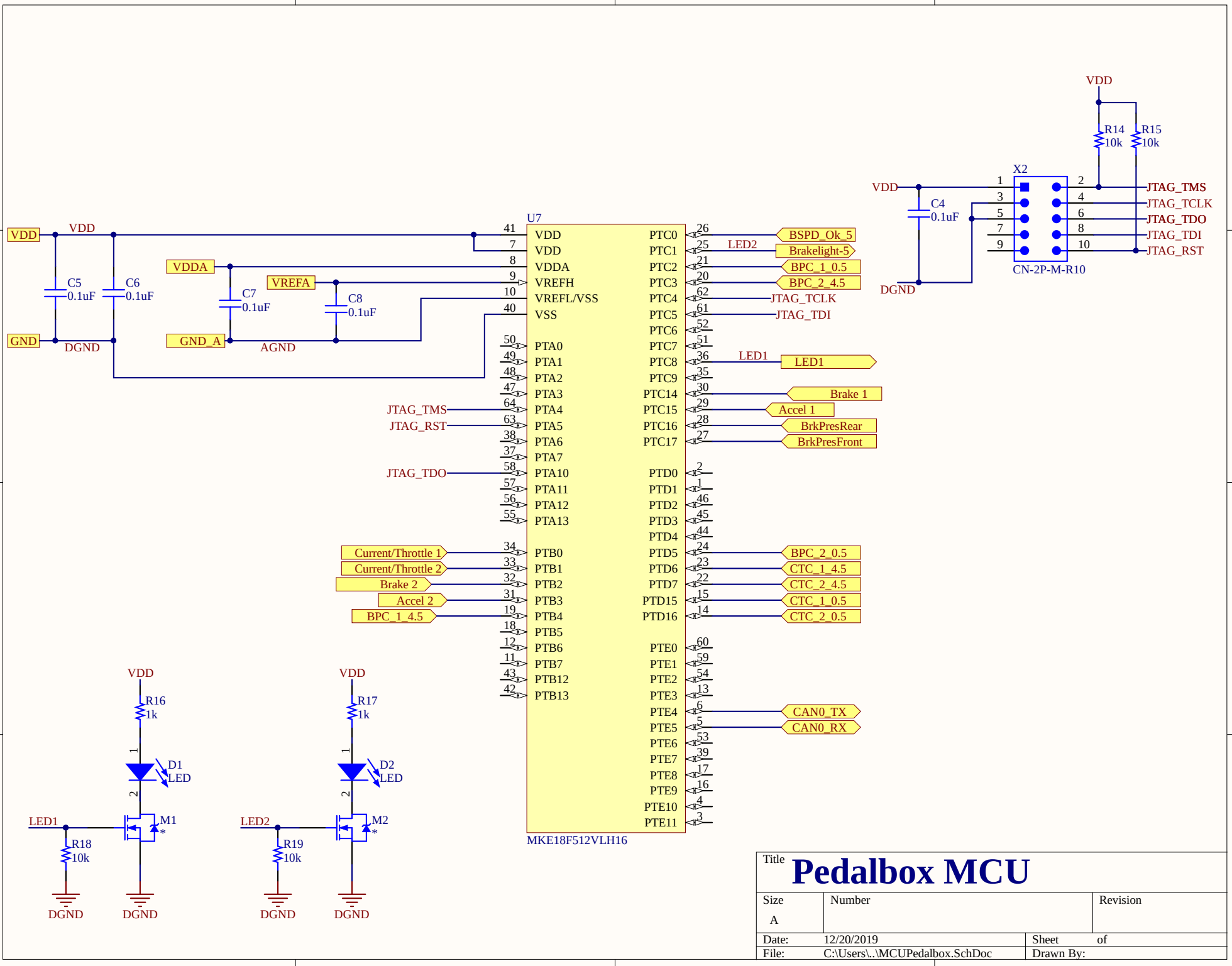




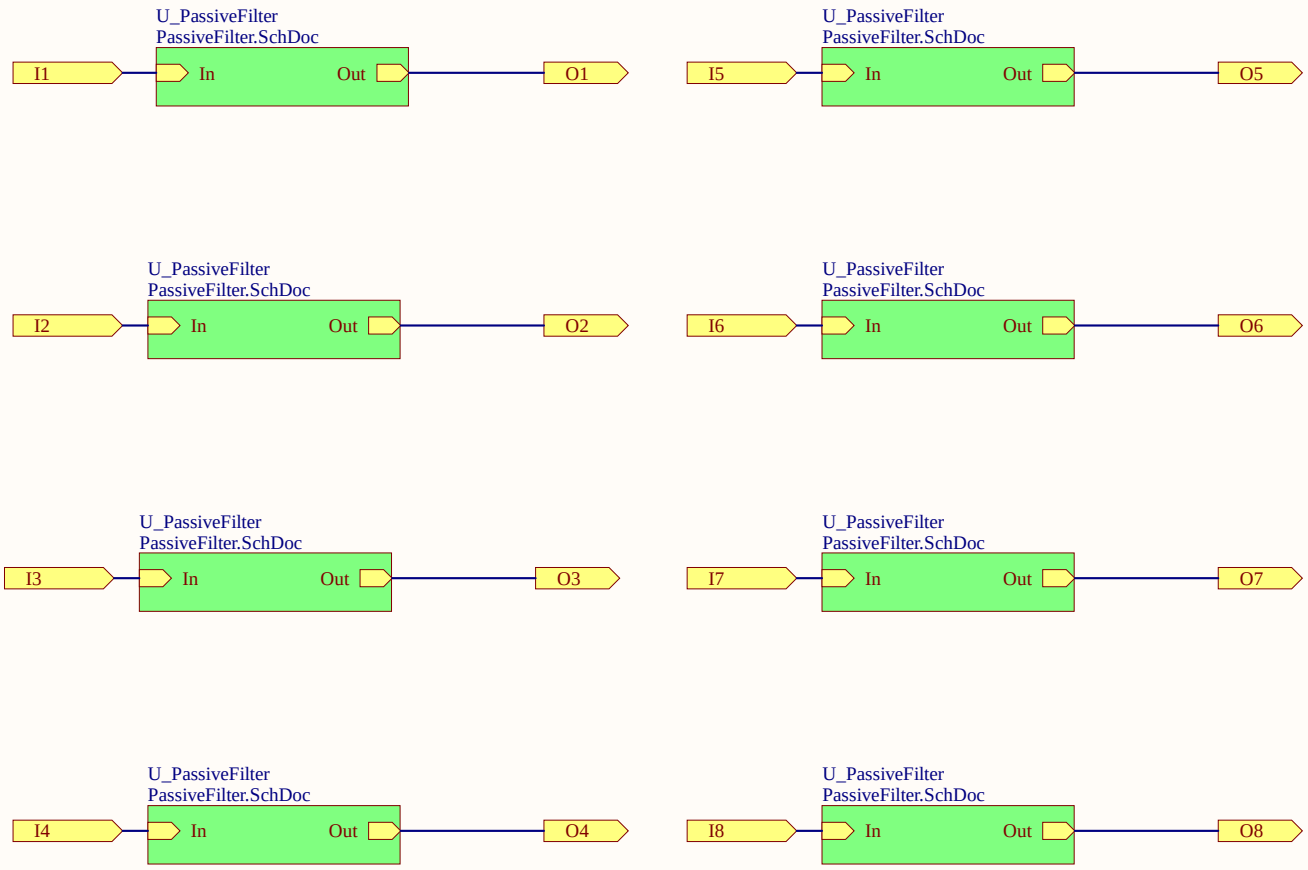
Title	**Divergent Signal Offset**		
Size A	Number		Revision
Date:	12/20/2019	Sheet	of
File:	C:\Users\..\DivergentSignalOffset.SchDoc	Drawn By:	



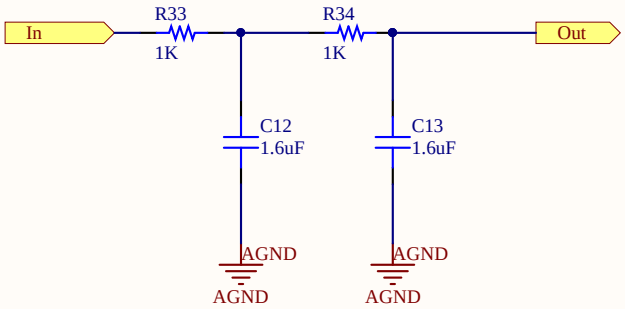
Title			
Size A	Number		Revision
Date:	12/20/2019	Sheet	of
File:	C:\Users\..\LowLatch.SchDoc	Drawn By:	



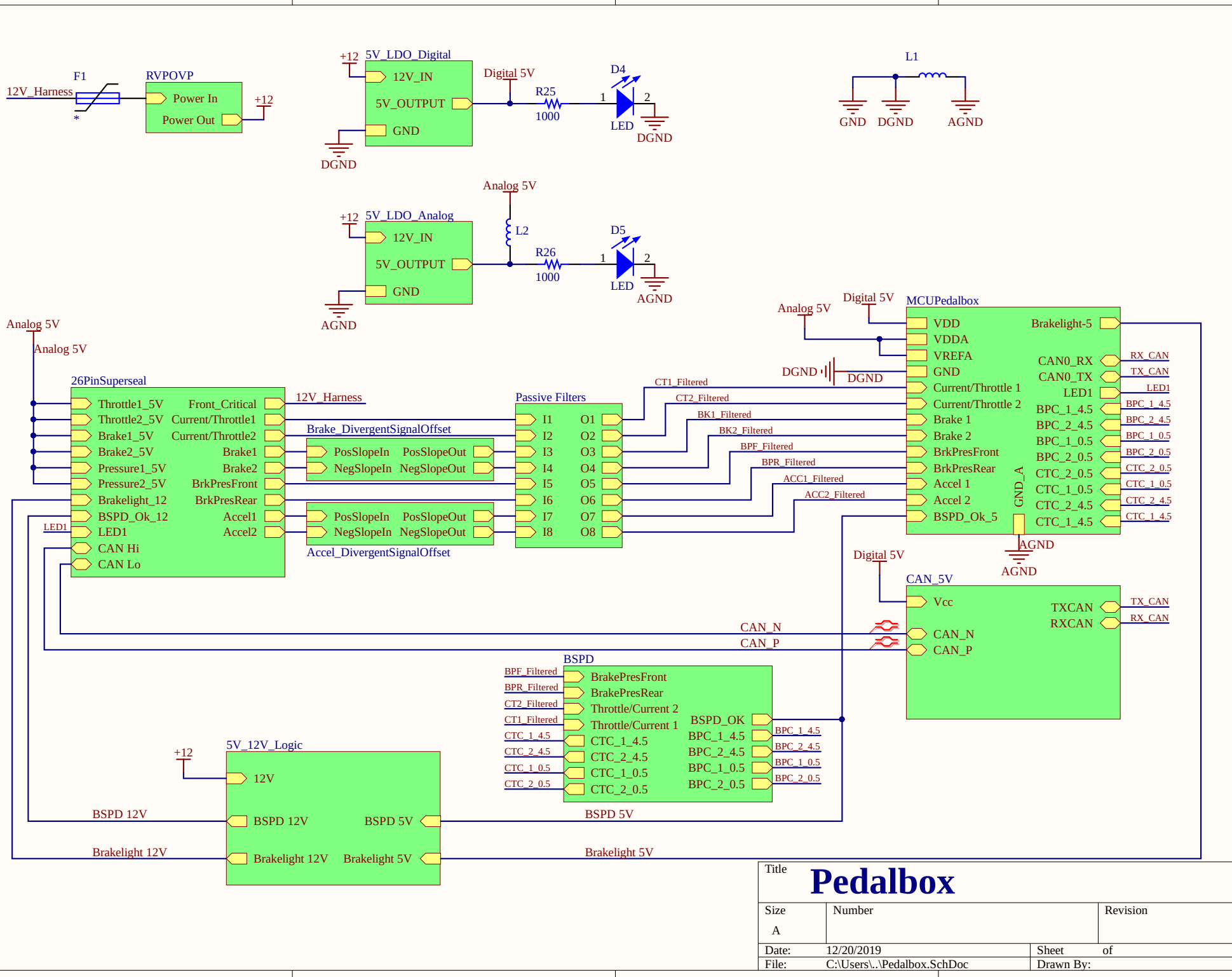
Title	**Pedalbox MCU**	
Size: A	Number:	Revision:
Date: 12/20/2019		Sheet of
File: C:\Users\..\MCUPedalbox.SchDoc		Drawn By:



Title		
Size A	Number	Revision
Date: 12/20/2019		Sheet of
File: C:\Users\..\Passive Filters.SchDoc		Drawn By:



Title	**Passive Filter**		
Size A	Number		Revision
Date:	12/20/2019	Sheet	of
File:	C:\Users\..\PassiveFilter.SchDoc	Drawn By:	


F1
12V_Harness
*
RVPOVP
Power In
Power Out
+12
5V_LDO_Digital
+12
12V_IN
5V_OUTPUT
GND
DGND
Digital 5V
R25
1000
D4
1
2
LED
DGND
L1
GND
DGND
AGND
Analog 5V
5V_LDO_Analog
+12
12V_IN
5V_OUTPUT
GND
AGND
L2
R26
1000
D5
1
2
LED
AGND
Analog 5V
Analog 5V
26PinSuperseal
Throttle1_5V
Throttle2_5V
Brake1_5V
Brake2_5V
Pressure1_5V
Pressure2_5V
Brakelight_12
BSPD_Ok_12
LED1
CAN Hi
CAN Lo
Front_Critical
Current/Throttle1
Current/Throttle2
Brake1
Brake2
BrkPresFront
BrkPresRear
Accel1
Accel2
12V_Harness
Brake_DivergentSignalOffset
PosSlopeIn
NegSlopeIn
PosSlopeOut
NegSlopeOut
Accel_DivergentSignalOffset
Passive Filters
I1
I2
I3
I4
I5
I6
I7
I8
O1
O2
O3
O4
O5
O6
O7
O8
CT1_Filtered
CT2_Filtered
BK1_Filtered
BK2_Filtered
BPF_Filtered
BPR_Filtered
ACC1_Filtered
ACC2_Filtered
Analog 5V
Digital 5V
MCUPedalbox
VDD
VDDA
VREFA
GND
Current/Throttle 1
Current/Throttle 2
Brake 1
Brake 2
BrkPresFront
BrkPresRear
Accel 1
Accel 2
BSPD_Ok_5
GND_A
Brakelight-5
CAN0_RX
CAN0_TX
LED1
BPC_1_4.5
BPC_2_4.5
BPC_1_0.5
BPC_2_0.5
CTC_2_0.5
CTC_1_0.5
CTC_2_4.5
CTC_1_4.5
RX_CAN
TX_CAN
LED1
BPC_1_4.5
BPC_2_4.5
BPC_1_0.5
BPC_2_0.5
CTC_2_0.5
CTC_1_0.5
CTC_2_4.5
CTC_1_4.5
DGND
DGND
AGND
AGND
Digital 5V
CAN_5V
Vcc
CAN_N
CAN_P
TXCAN
RXCAN
TX_CAN
RX_CAN
CAN_N
CAN_P
BSPD
BPF_Filtered
BPR_Filtered
CT2_Filtered
CT1_Filtered
CTC_1_4.5
CTC_2_4.5
CTC_1_0.5
CTC_2_0.5
BrakePresFront
BrakePresRear
Throttle/Current 2
Throttle/Current 1
CTC_1_4.5
CTC_2_4.5
CTC_1_0.5
CTC_2_0.5
BSPD_OK
BPC_1_4.5
BPC_2_4.5
BPC_1_0.5
BPC_2_0.5
BPC_1_4.5
BPC_2_4.5
BPC_1_0.5
BPC_2_0.5
5V_12V_Logic
+12
12V
BSPD 12V
BSPD 12V
BSPD 5V
BSPD 5V
Brakelight 12V
Brakelight 12V
Brakelight 5V
Brakelight 5V
Title
Pedalbox
Size
A
Number
Revision
Date:
12/20/2019
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of
File:
C:\Users\..\Pedalbox.SchDoc
Drawn By:

Brake Front — Brake Front

Brake Rear — Brake Rear

Brake Front REF — Brake Front REF

Brake Rear REF — Brake Rear REF

Throttle/Current 1 — Throttle/Current 1

Throttle/Current 2 — Throttle 2

Current/Throttle 1 REF — Current/Throttle 1 REF

Current/Throttle 2 REF — Current/Throttle 2 REF

"Plausibility Status" will be set HIGH if:

Brake Front OR Brake Rear pressure are above their respective setpoints

AND

EITHER Current/Throttle sensor goes above its respective setpoint

Analog 5V

U8A
LT1018 Dual Comparator

Brake Front

Brake Front REF

AGND

AGND

Analog 5V

U9
SN74LVC1G32 OR Gate

AGND

AGND

U8B

Brake Rear

Brake Rear REF

LT1018 Dual Comparator

Analog 5V

U4B

Plausibility Status

74HC21D AND Gate

Analog 5V

U11A
LT1018 Dual Comparator

Throttle/Current 1

Current/Throttle 1 REF

AGND

AGND

Analog 5V

U12
SN74LVC1G32 OR Gate

AGND

AGND

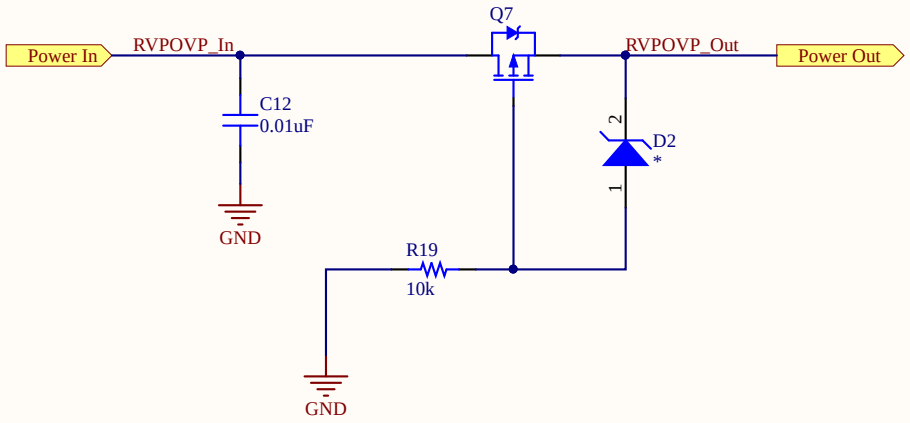
U11B

Throttle 2

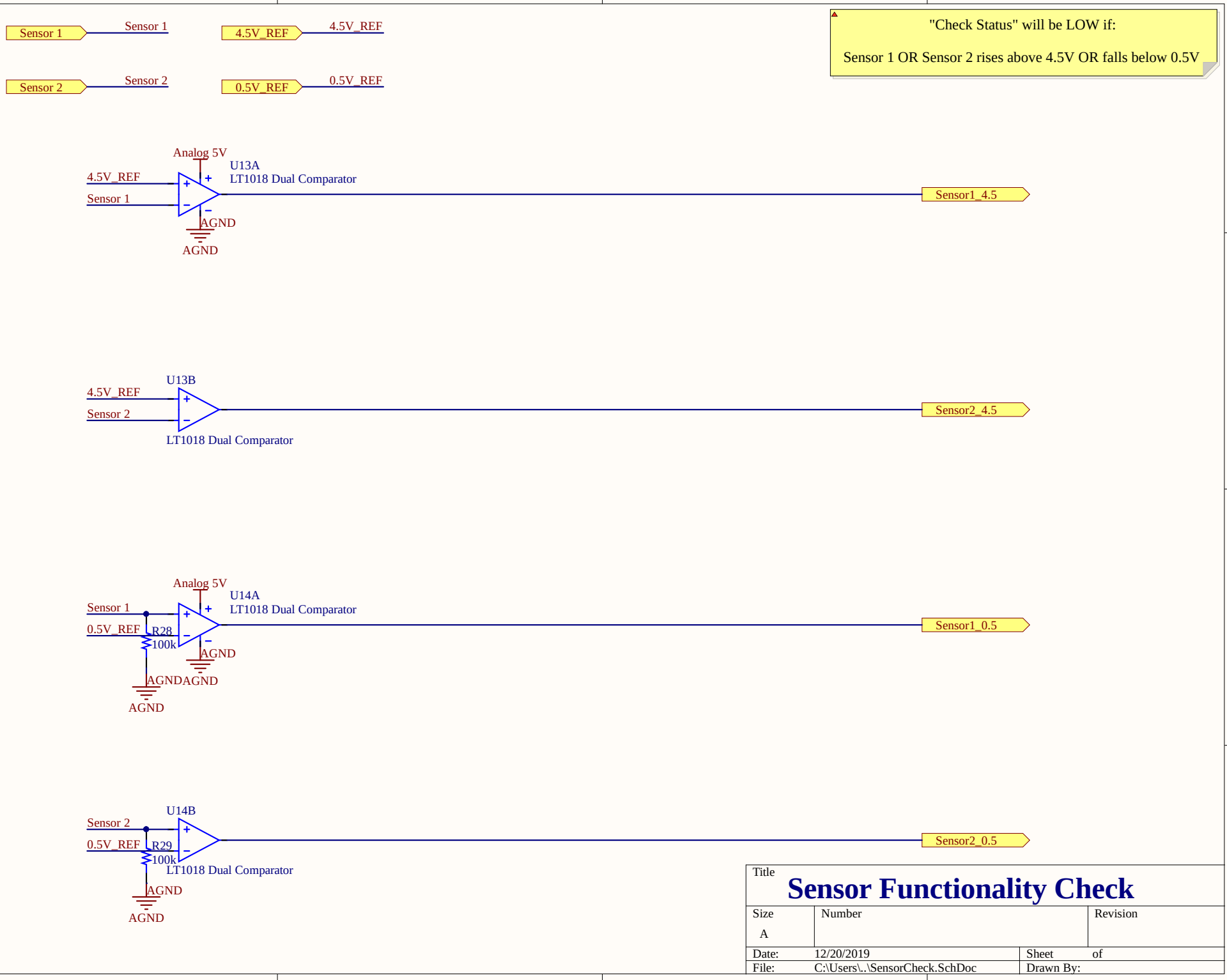
Current/Throttle 2 REF

LT1018 Dual Comparator

Title	Plausibility Trigger	
Size: A	Number:	Revision:
Date: 12/20/2019		Sheet of
File: C:\Users\..\PlausibilityTrigger.SchDoc		Drawn By:

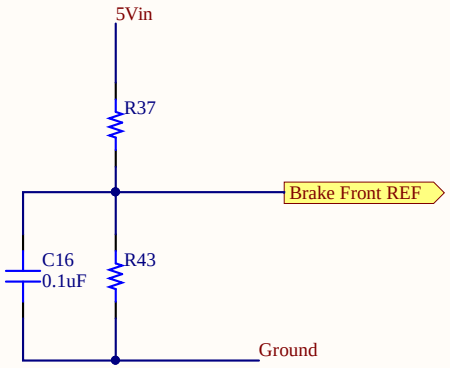


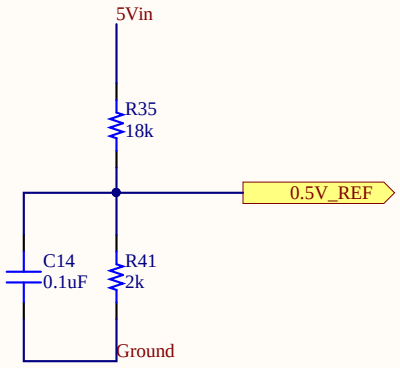
Title		
Size: A	Number	Revision
Date: 12/20/2019		Sheet of
File: C:\Users\..\RVPOVP.SchDoc		Drawn By:

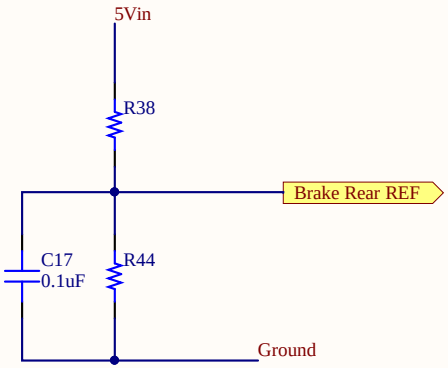

Sensor 1
Sensor 1
4.5V_REF
4.5V_REF
Sensor 2
Sensor 2
0.5V_REF
0.5V_REF
"Check Status" will be LOW if:
Sensor 1 OR Sensor 2 rises above 4.5V OR falls below 0.5V
Analog 5V
U13A
LT1018 Dual Comparator
4.5V_REF
Sensor 1
AGND
AGND
Sensor1_4.5
U13B
4.5V_REF
Sensor 2
LT1018 Dual Comparator
Sensor2_4.5
Analog 5V
U14A
LT1018 Dual Comparator
Sensor 1
0.5V_REF
R28
100k
AGND
AGND
AGND
Sensor1_0.5
U14B
Sensor 2
0.5V_REF
R29
100k
LT1018 Dual Comparator
AGND
AGND
Sensor2_0.5
Title
Sensor Functionality Check
Size
A
Number
Revision
Date:
12/20/2019
Sheet
of
File:
C:\Users\..\SensorCheck.SchDoc
Drawn By:

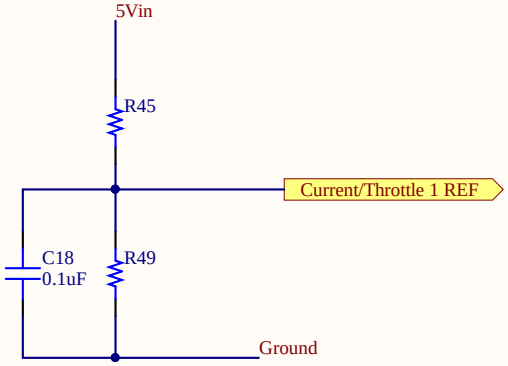
Simple resistive voltage reference generator. Generates a set 4.5V and 0.5V reference for sensor checking.
(There are no longer adjustment pots as a space saving measure)

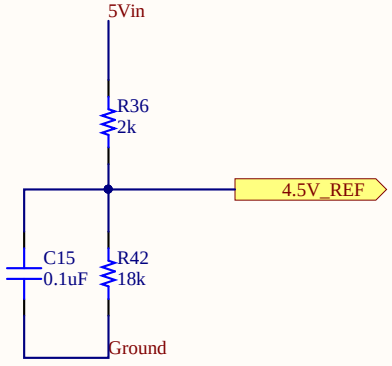
NOTE: Resistor values intentionally left out of adjustable refrences to alllow for proper selection during testing and implimentation, to better match the real world sensor.

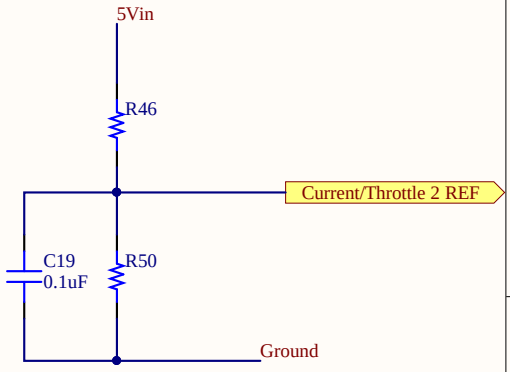


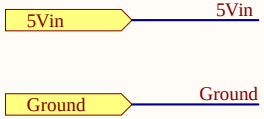




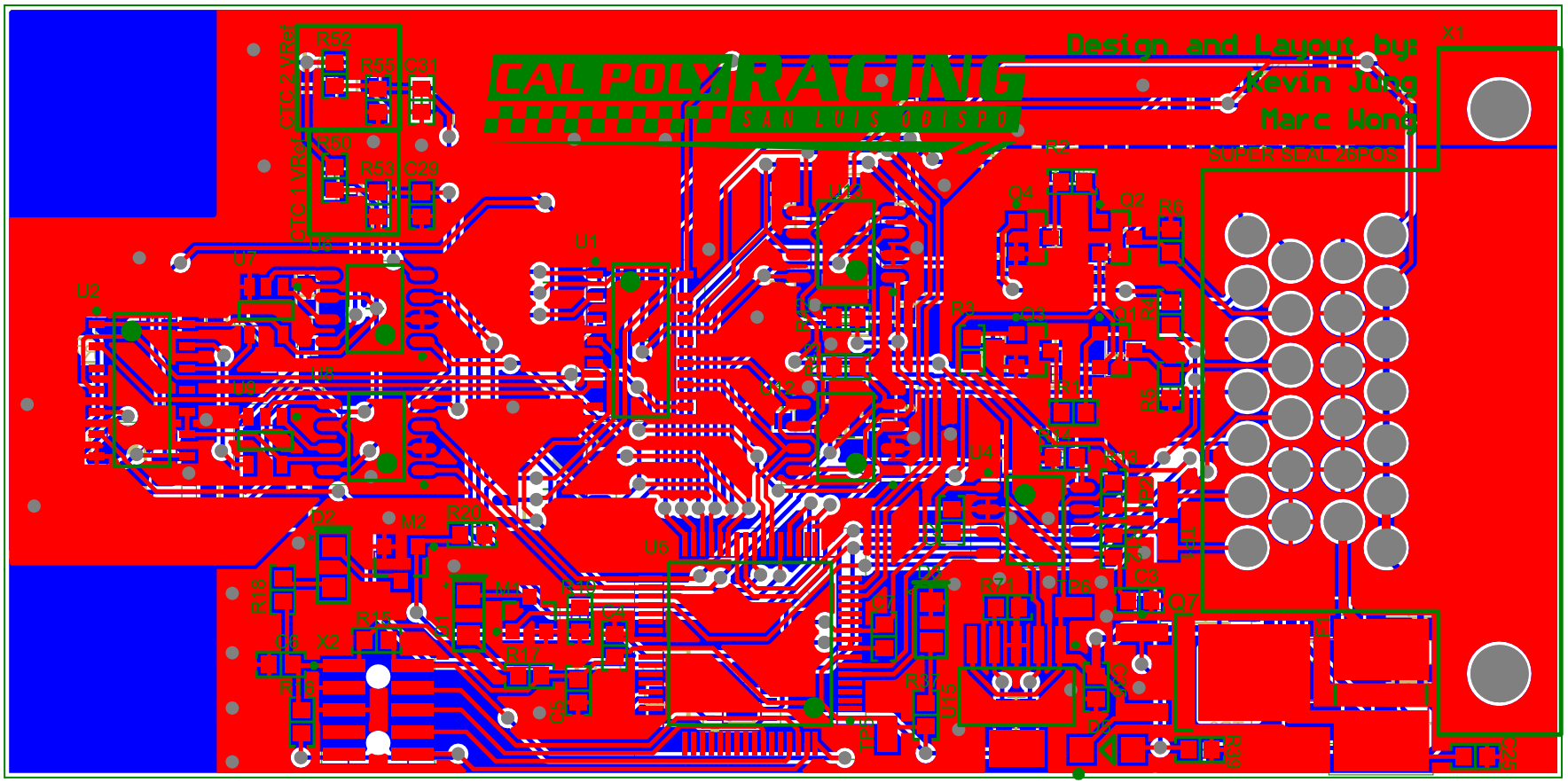








Title: **Voltage Reference Generator**		
Size: A	Number:	Revision:
Date: 12/20/2019		Sheet of
File: C:\Users\..\VoltageReferenceGen.SchDoc		Drawn By:


CAL POLY RACING
SAN LUIS OBISPO
Design and Layout by:
Kevin Jung
Marc Wong
SUPER SEAL 26POS
CTC_2.VRef
CTC_1.VRef
R52
R53
C31
R50
R51
C29
U1
U2
U4
U5
U7
X1
X2
Q1
Q2
Q4
Q7
R6
R20
R71
C3
M2