



ON Semiconductor®

USB-PD 4-Port Source

Comment Legend

- Description
- Optional
- Not Required

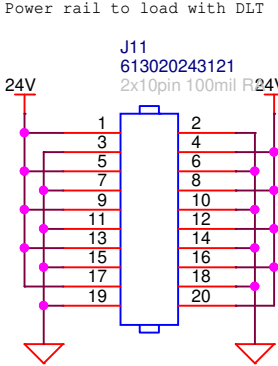
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Title USB-PD 4-Port Source		
Size Custom	Document Number ONSEC-17-038	Rev REV2
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24V Input Filter

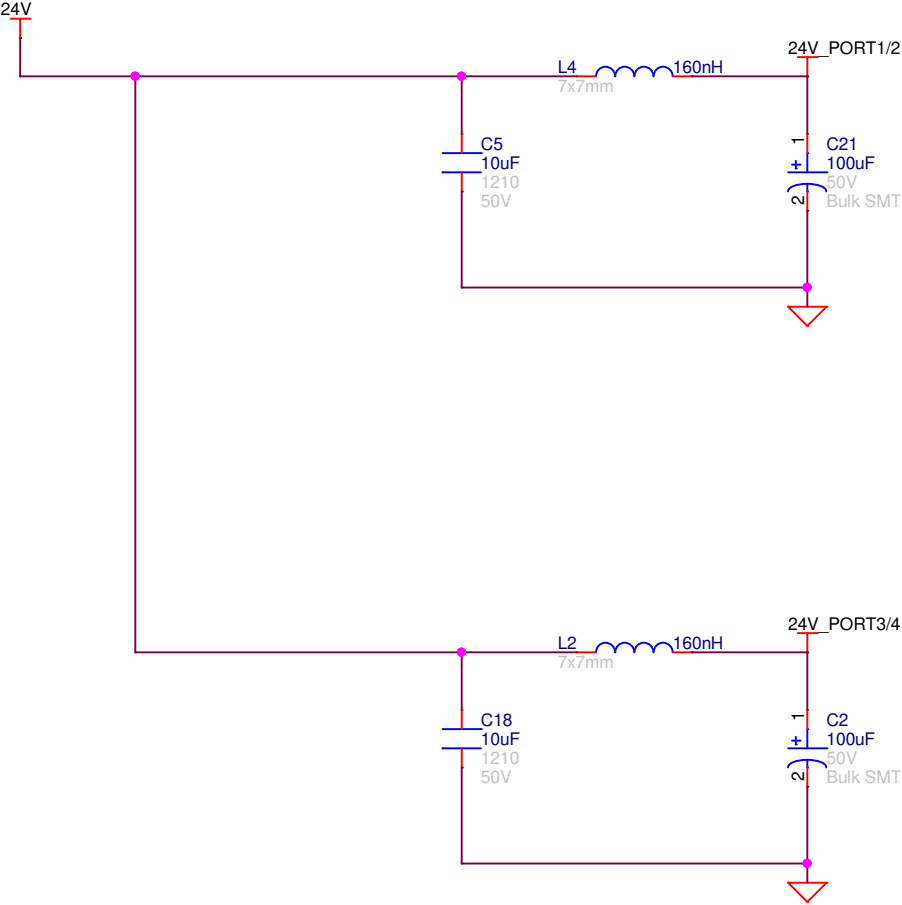
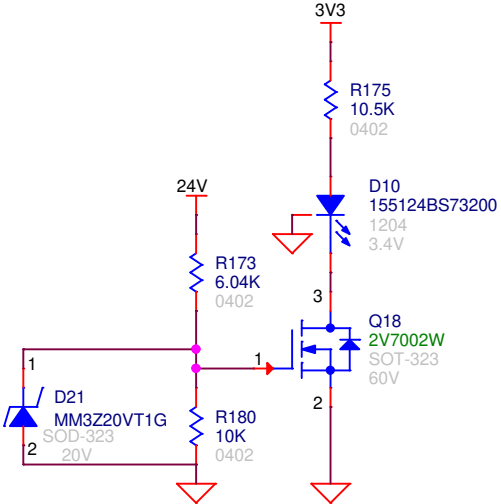
Strata Connected
Not Required
for Customer Design

INPUT POWER HEADER



Indicator
Optional for Customer Design

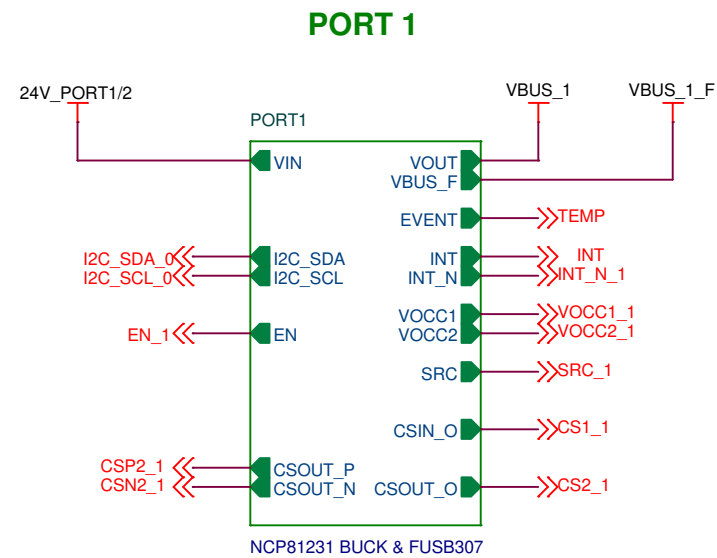
INPUT VOLTAGE INDICATOR



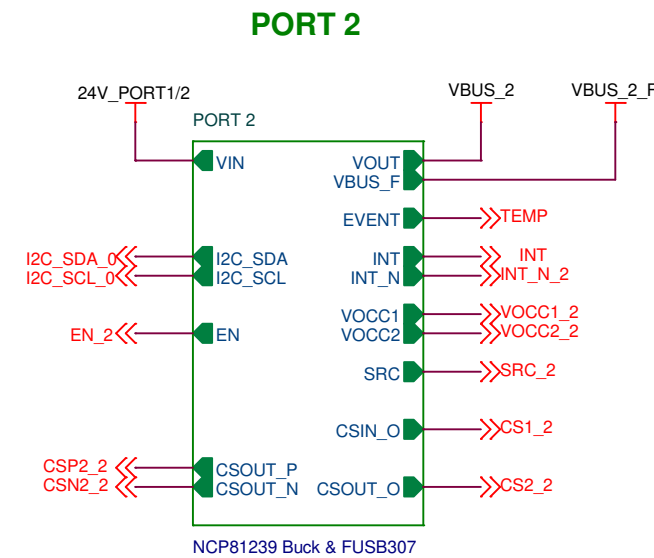
ON Semiconductor

Title 24V Input Filter		
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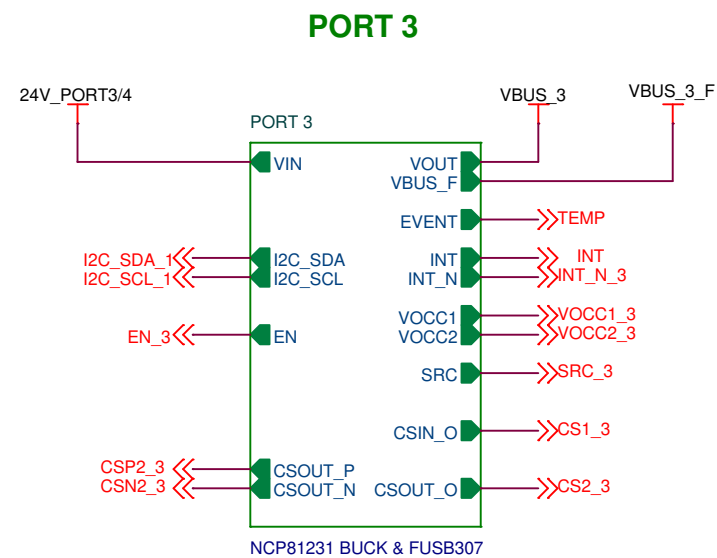
NCP8123x Power Modules



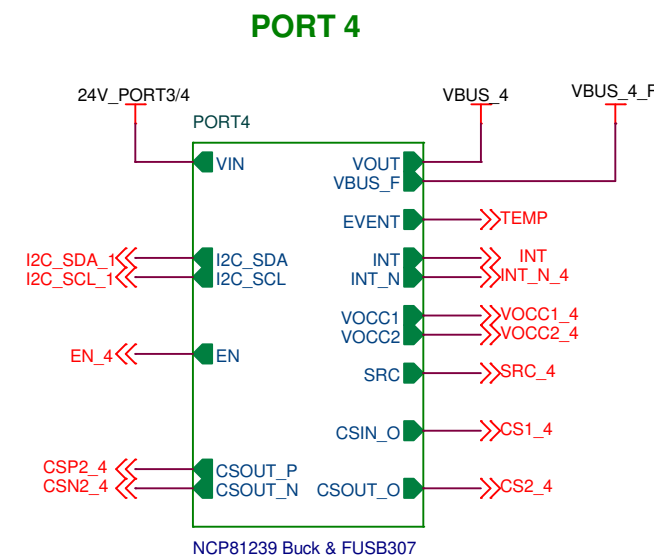
ADDRESSES:
 0x77 NCP81231 Buck
 0x50 FUSB307B Port Controller
 0x1A N34TS04 Temp Sensor
 0x52 N34TS04 EEPROM



ADDRESSES:
 0x74 NCP81239 Buck
 0x51 FUSB307B Port Controller
 0x1B N34TS04 Temp Sensor
 0x53 N34TS04 EEPROM



ADDRESSES:
 0x77 NCP81231 Buck
 0x50 FUSB307B Port Controller
 0x1A N34TS04 Temp Sensor
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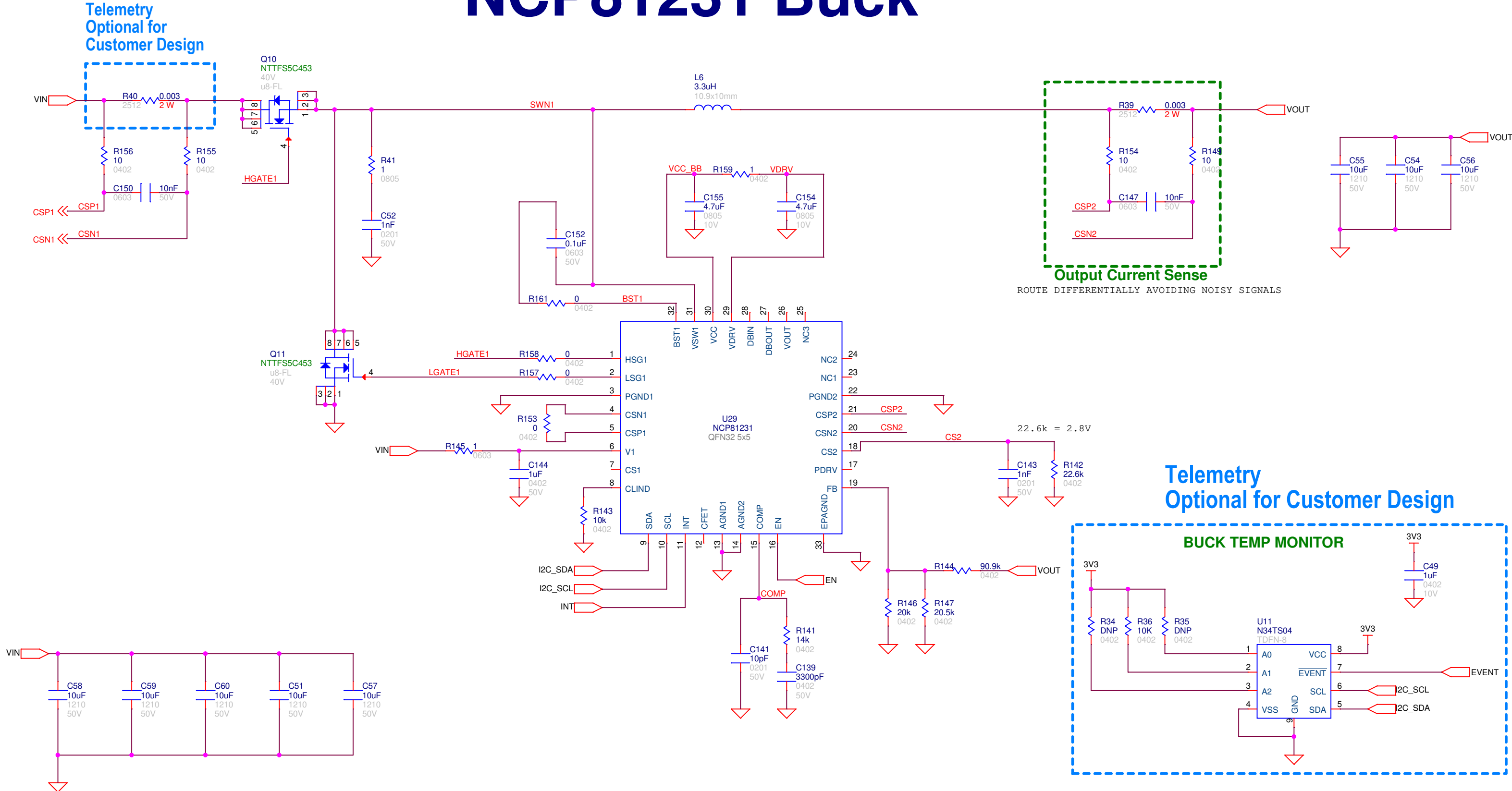


ADDRESSES:
 0x74 NCP81239 Buck
 0x51 FUSB307B Port Controller
 0x1B N34TS04 Temp Sensor
 0x53 N34TS04 EEPROM

ON Semiconductor

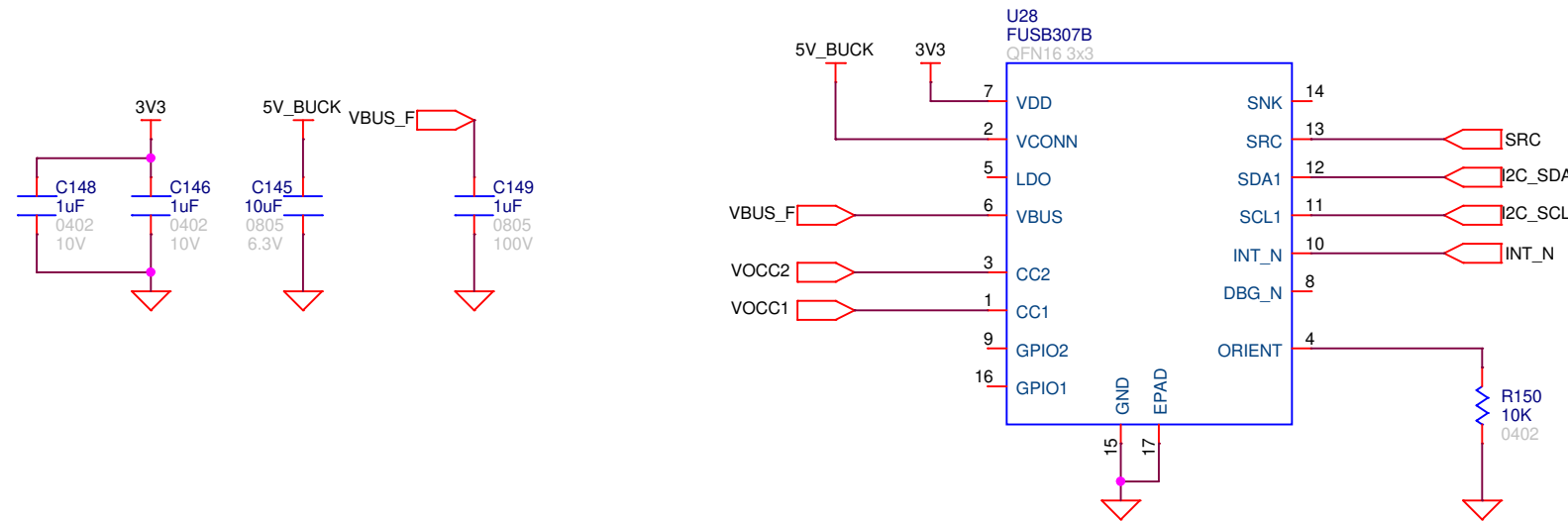
Title NCP8123x Power Modules		
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NCP81231 Buck



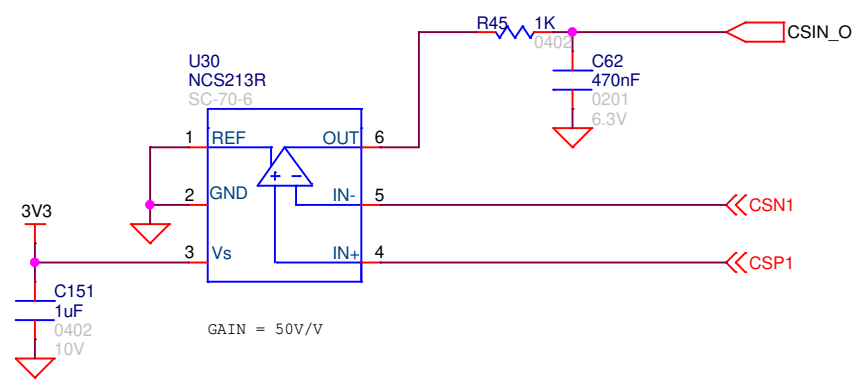
Port Controller and Current Sense

FUSB307B PORT CONTROLLER



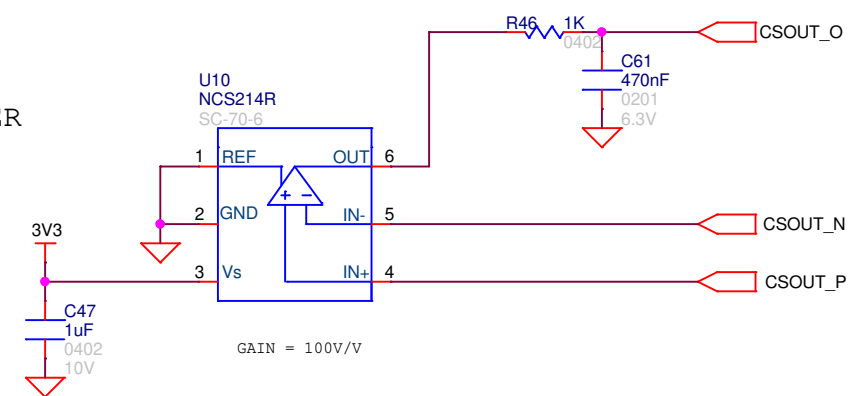
Telemetry Optional for Customer Design

INPUT CURRENT SENSE



VERIFY CSOUT DOES NOT EXCEED MAX VOLTAGE GOING TO THE MICROCONTROLLER

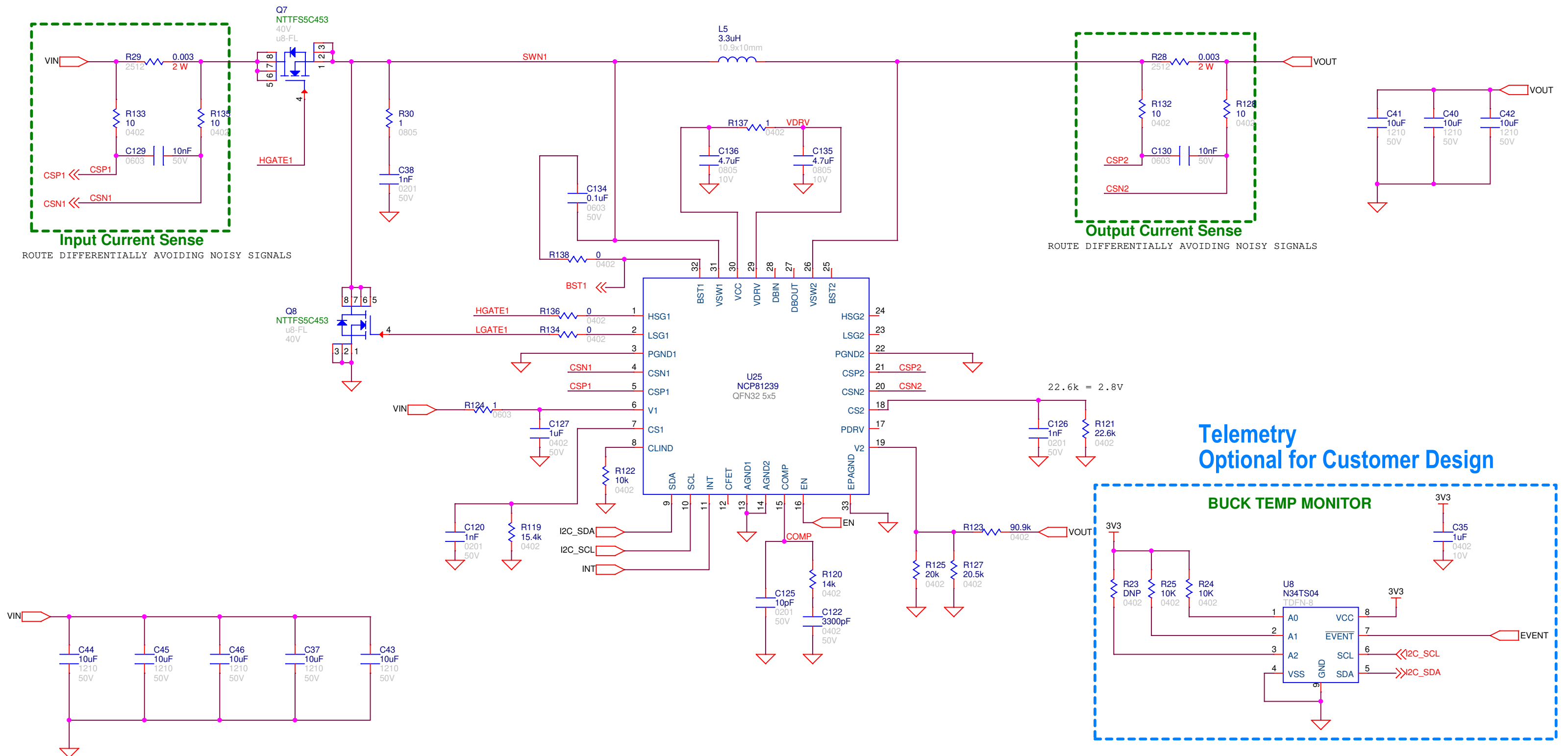
OUTPUT CURRENT SENSE



ON Semiconductor

Title Port Controller and Current Sense		
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NCP81239 Buck



Input Current Sense
ROUTE DIFFERENTIALLY AVOIDING NOISY SIGNALS

Output Current Sense
ROUTE DIFFERENTIALLY AVOIDING NOISY SIGNALS

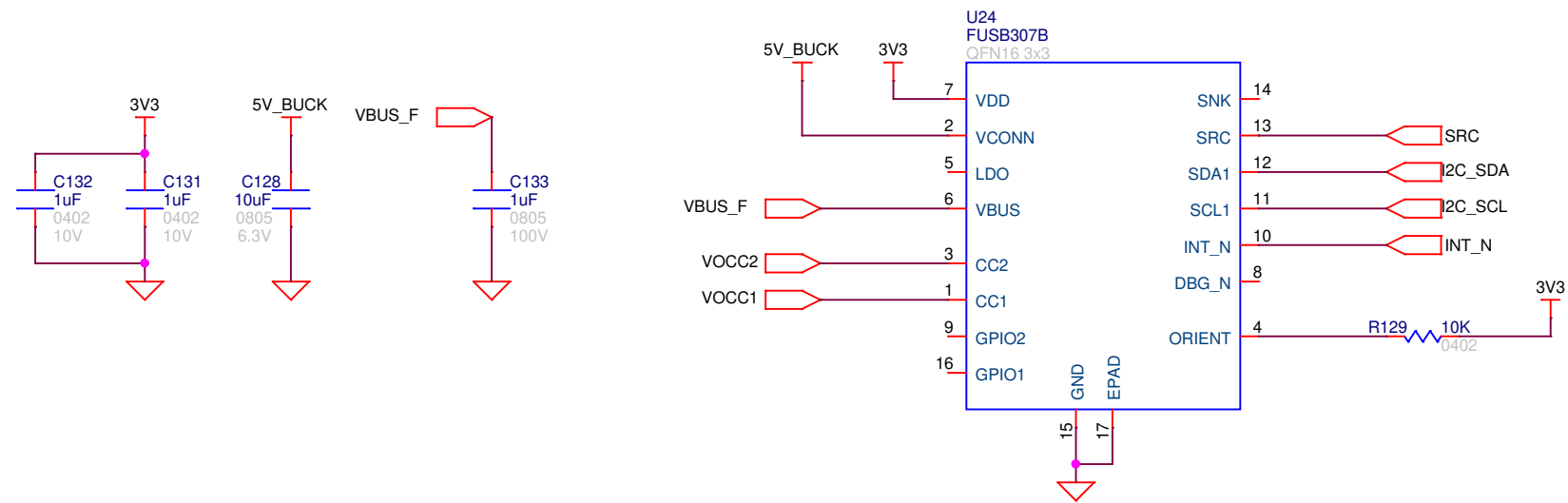
Telemetry
Optional for Customer Design

BUCK TEMP MONITOR

ON Semiconductor		
Title NCP81239 Buck		
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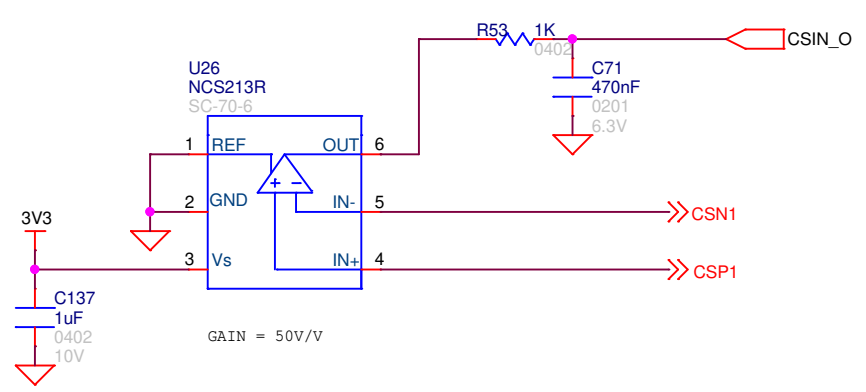
Port Controller and Current Sense

FUSB307B PORT CONTROLLER



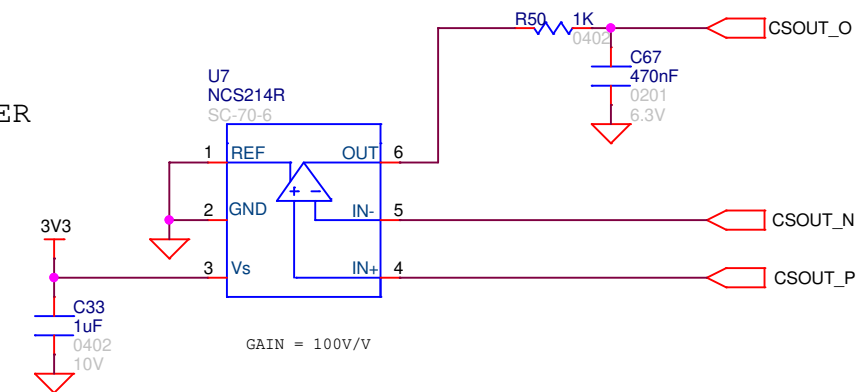
Telemetry Optional for Customer Design

INPUT CURRENT SENSE



VERIFY CSOUT DOES NOT EXCEED MAX VOLTAGE GOING TO THE MICROCONTROLLER

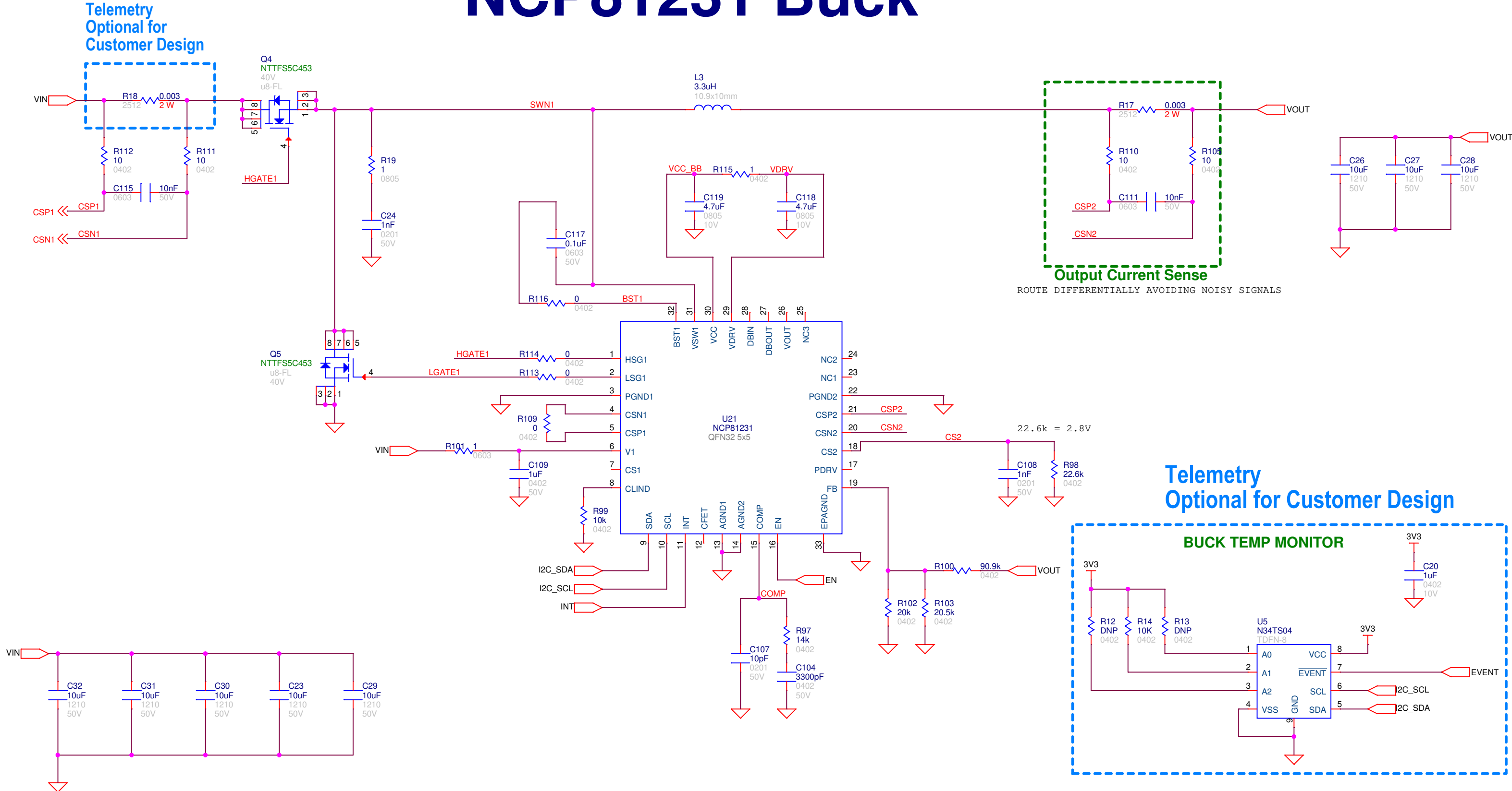
OUTPUT CURRENT SENSE



ON Semiconductor

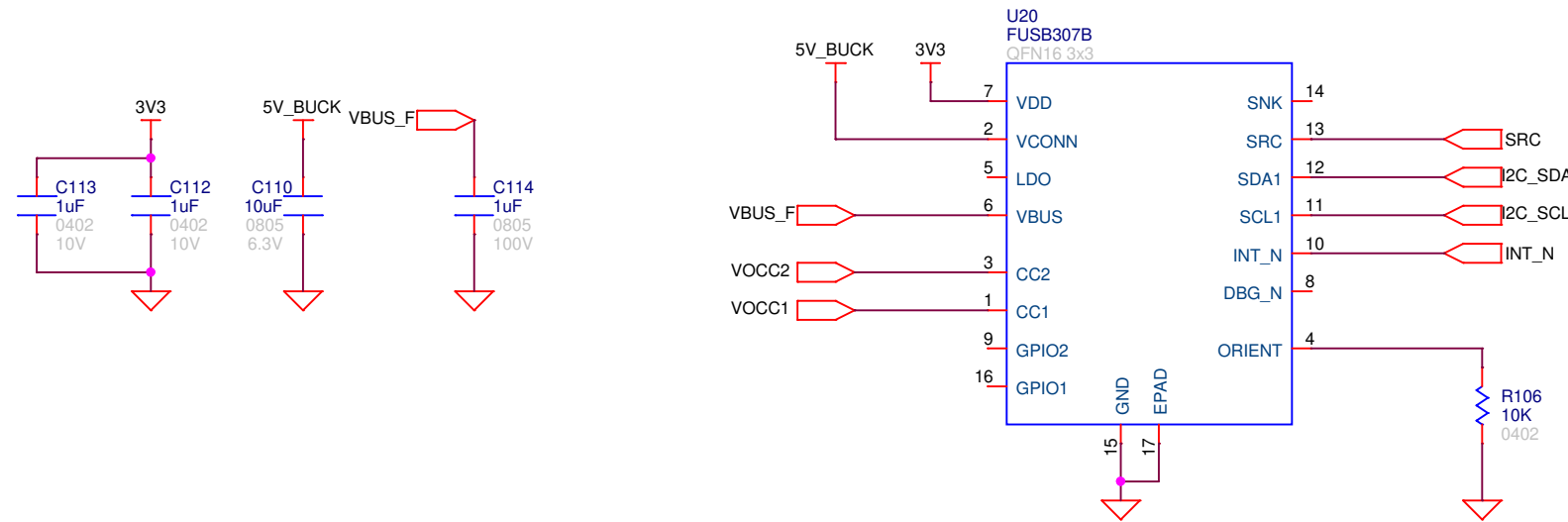
Title Port Controller and Current Sense		
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NCP81231 Buck



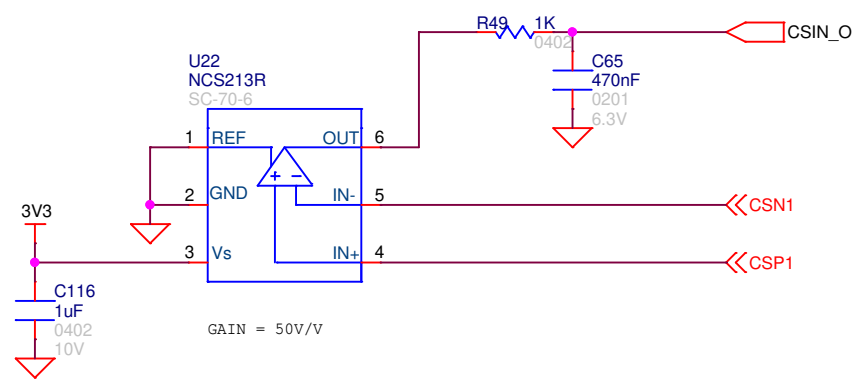
Port Controller and Current Sense

FUSB307B PORT CONTROLLER



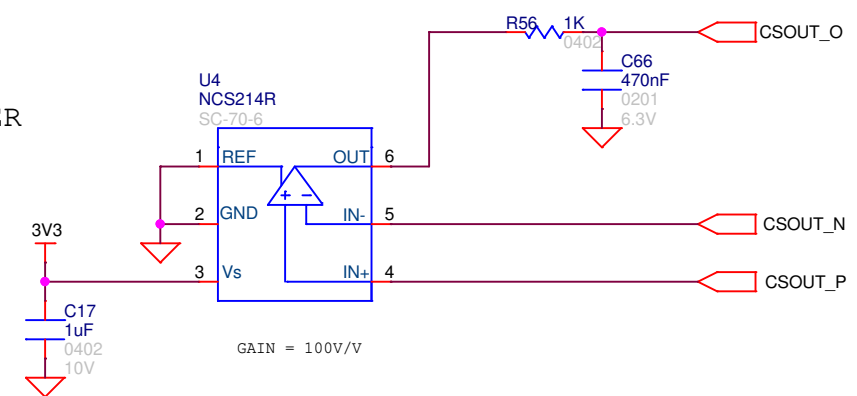
Telemetry Optional for Customer Design

INPUT CURRENT SENSE



VERIFY CSOUT DOES NOT EXCEED MAX
VOLTAGE GOING TO THE MICROCONTROLLER

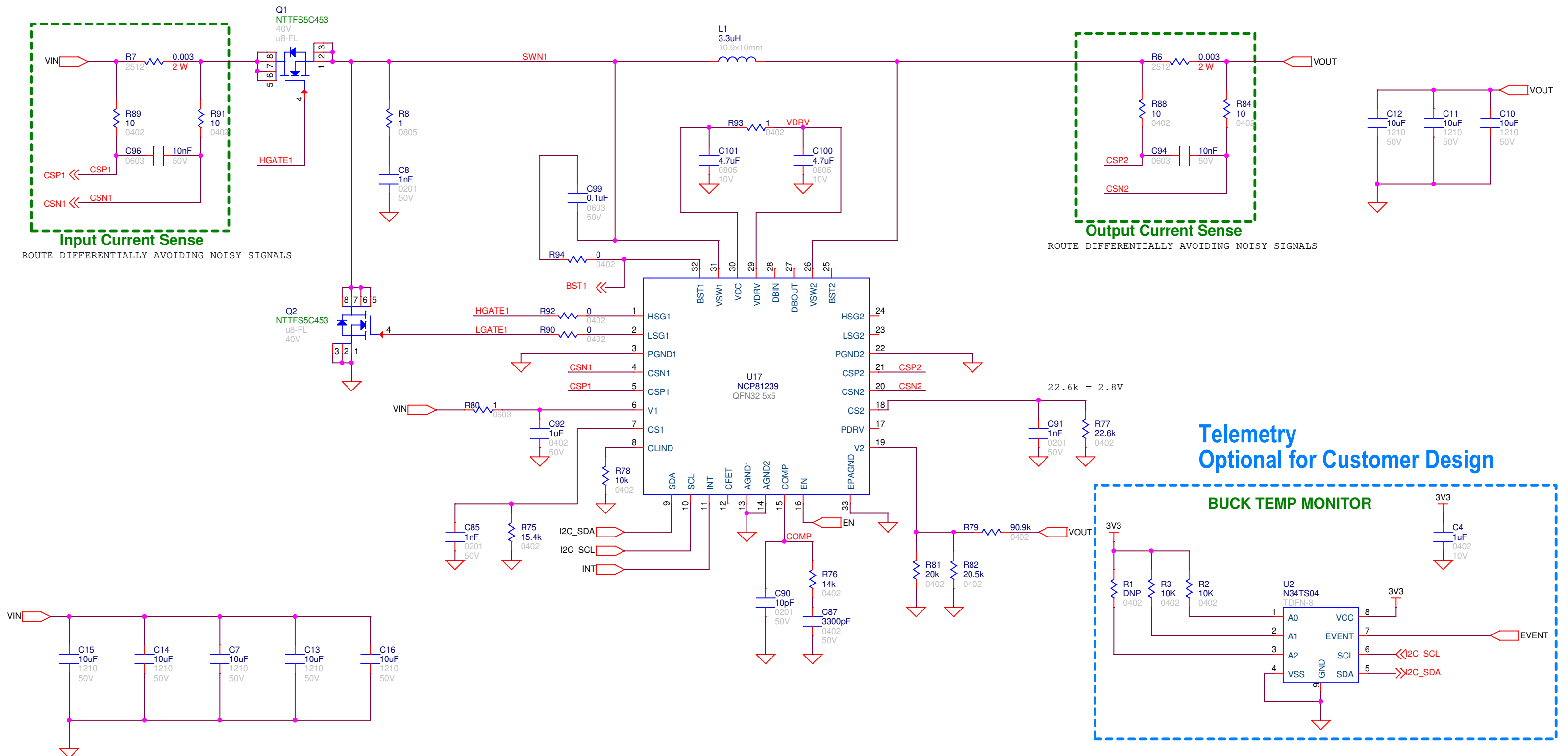
OUTPUT CURRENT SENSE



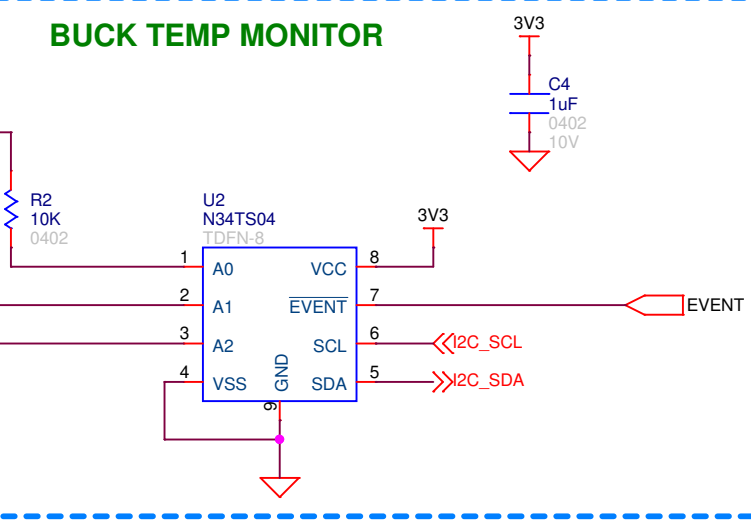
ON Semiconductor

Title Port Controller and Current Sense		
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NCP81239 Buck



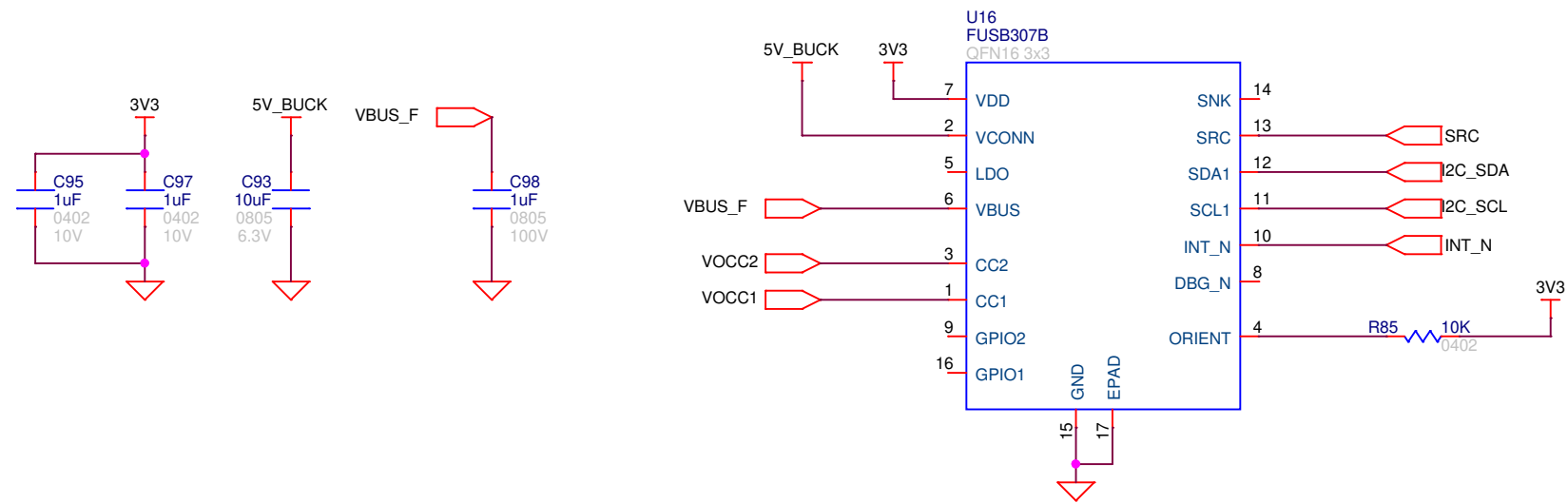
Telemetry
Optional for Customer Design



ON Semiconductor		
Title NCP81239 Buck		
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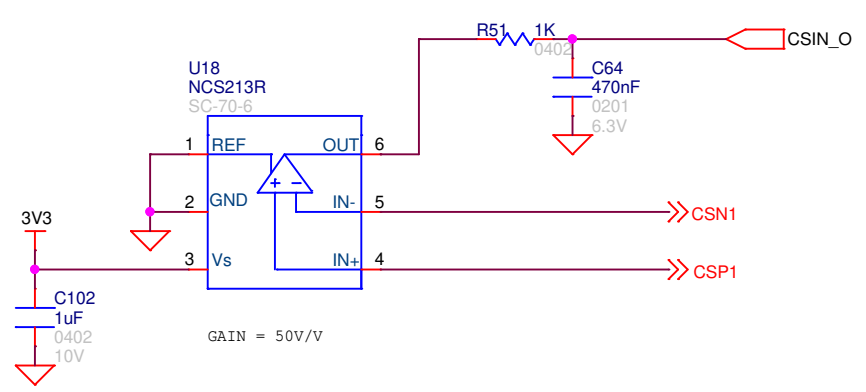
Port Controller and Current Sense

FUSB307B PORT CONTROLLER



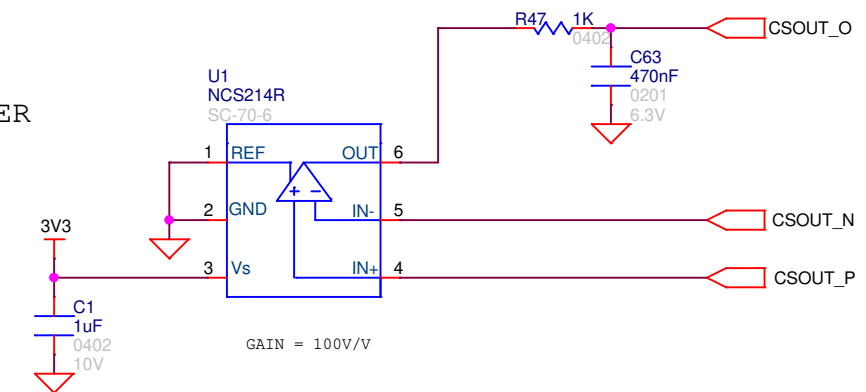
Telemetry Optional for Customer Design

INPUT CURRENT SENSE



VERIFY CSOUT DOES NOT EXCEED MAX VOLTAGE GOING TO THE MICROCONTROLLER

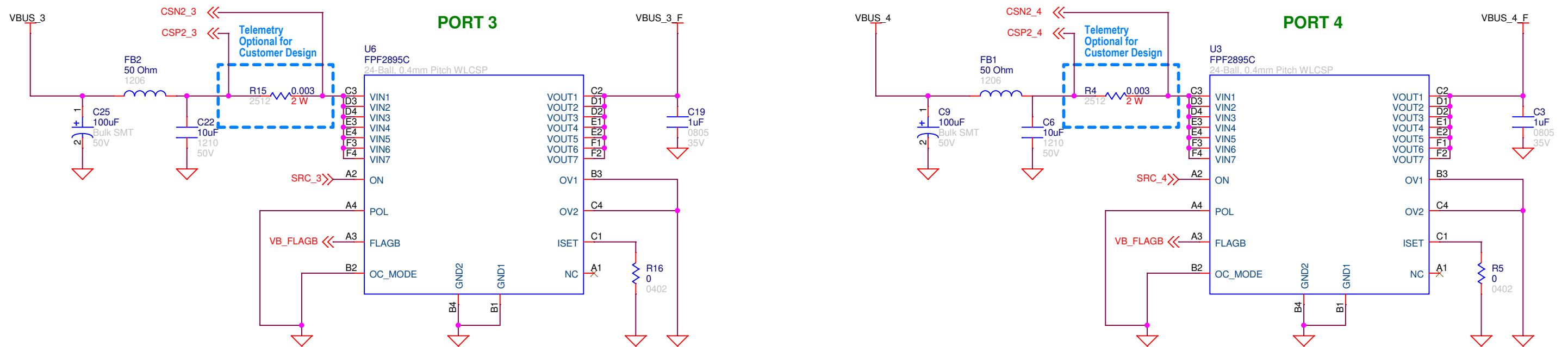
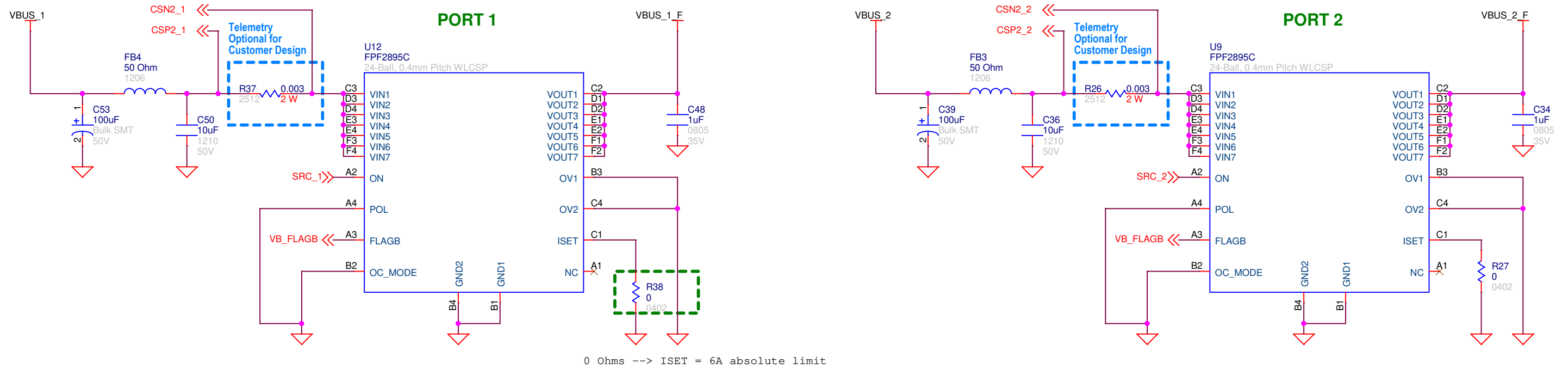
OUTPUT CURRENT SENSE



ON Semiconductor

Title Port Controller and Current Sense		
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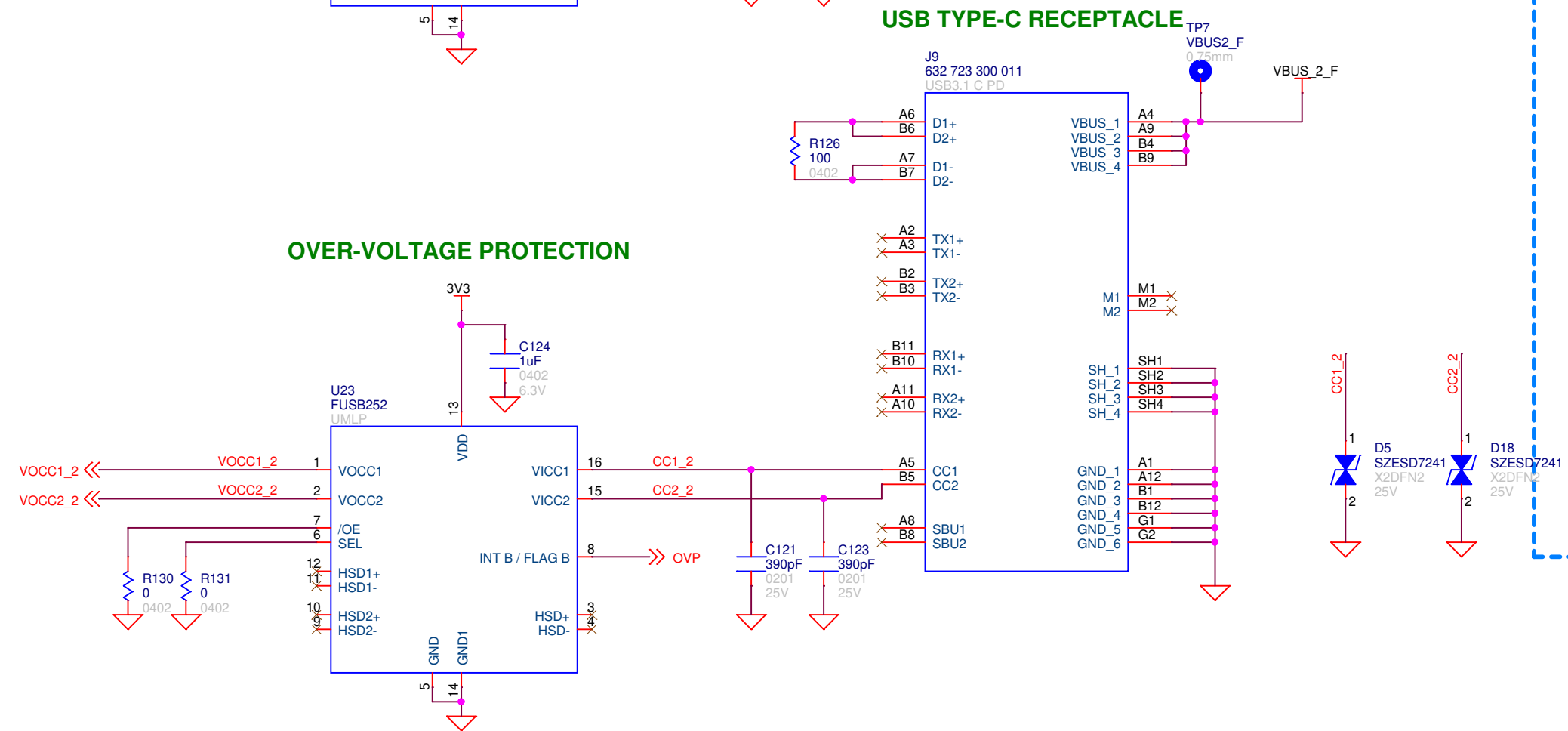
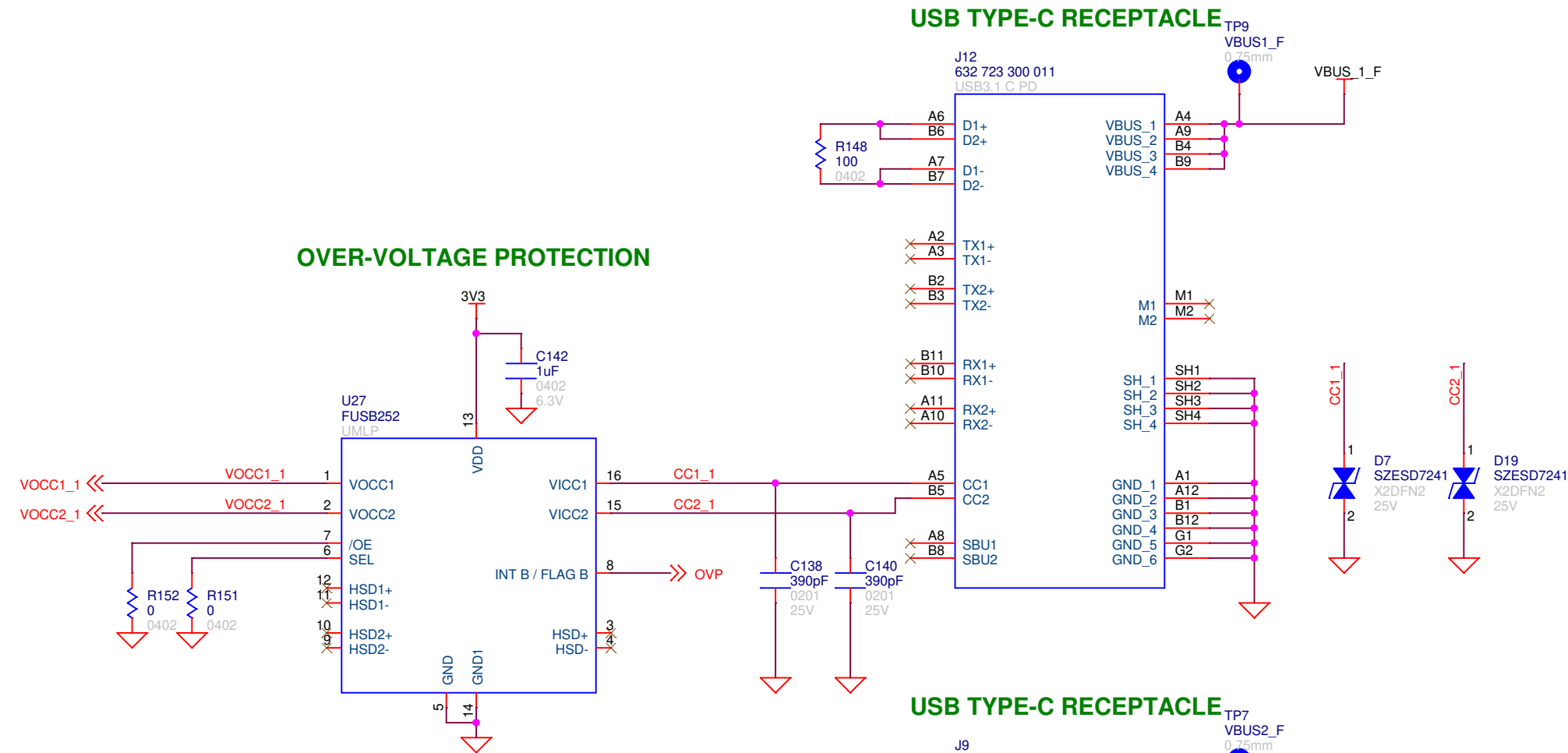
Port Power Disconnect



ON Semiconductor

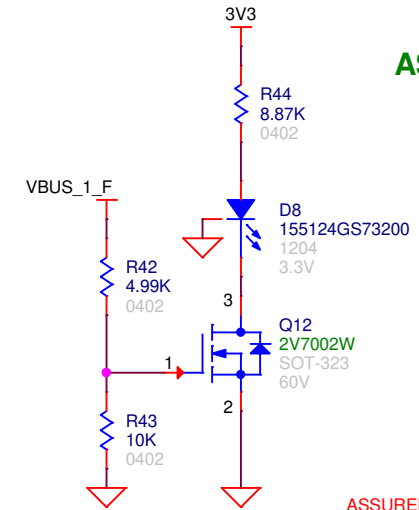
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Size Custom	Document Number ONSEC-17-038	Rev REV2
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FUSB252 and USBC Connector

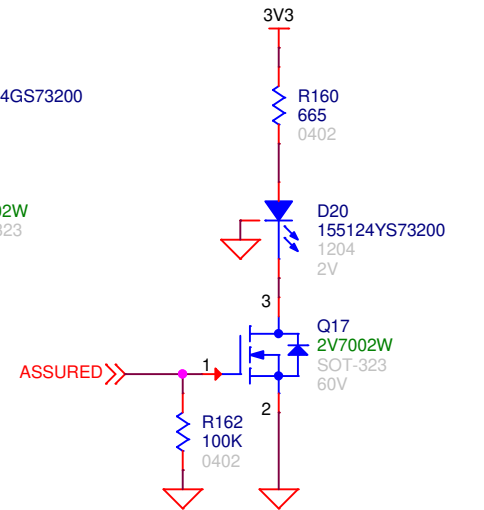


Indicator Optional for Customer Design

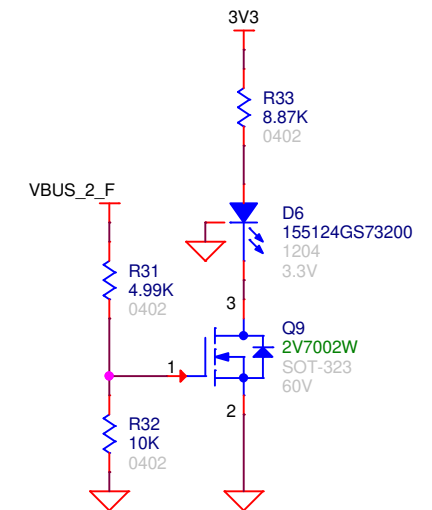
OUTPUT VOLTAGE INDICATOR



ASSURED PORT INDICATOR



OUTPUT VOLTAGE INDICATOR

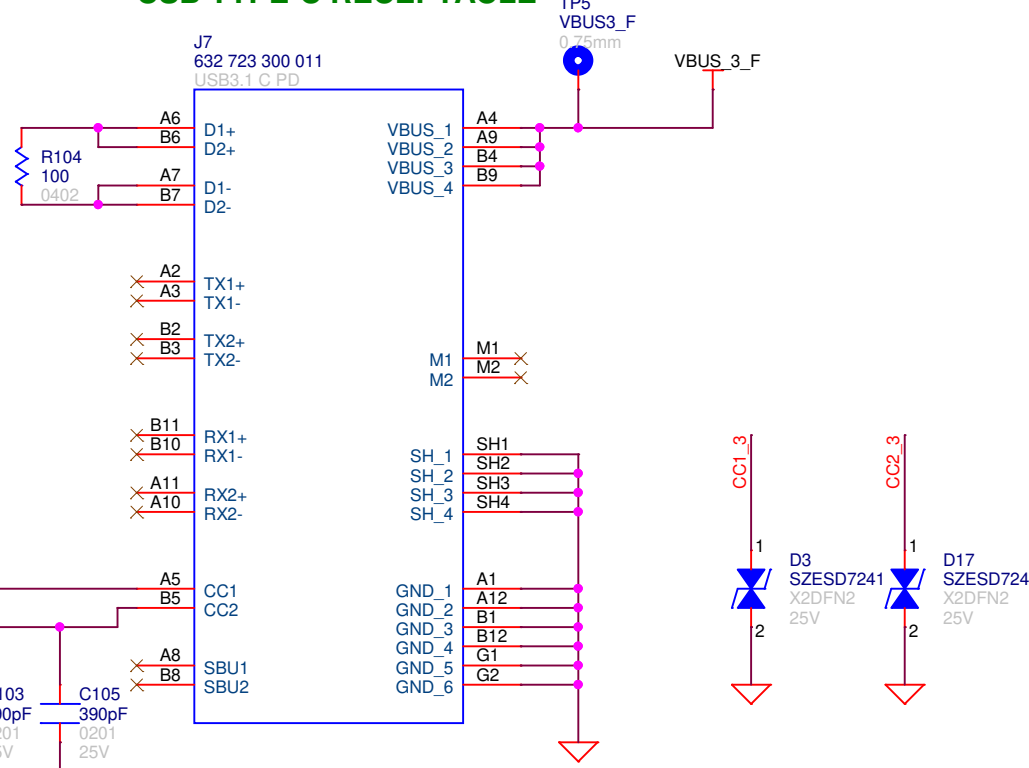


ON Semiconductor

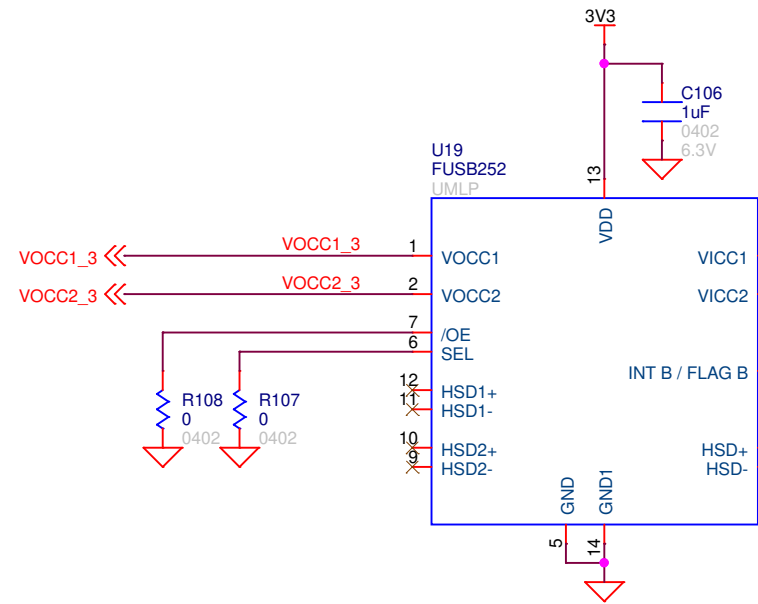
Title FUSB252 and USBC Connector 1		
Size Custom	Document Number ONSEC-17-038	Rev REV2
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FUSB252 and USBC Connector

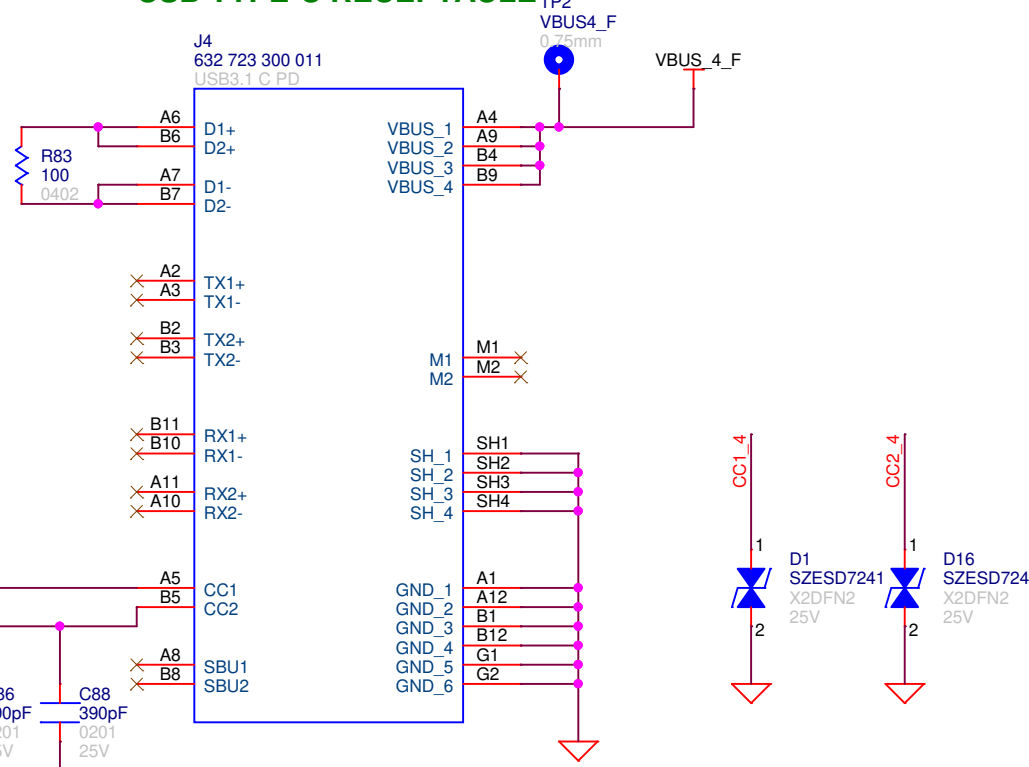
USB TYPE-C RECEPTACLE



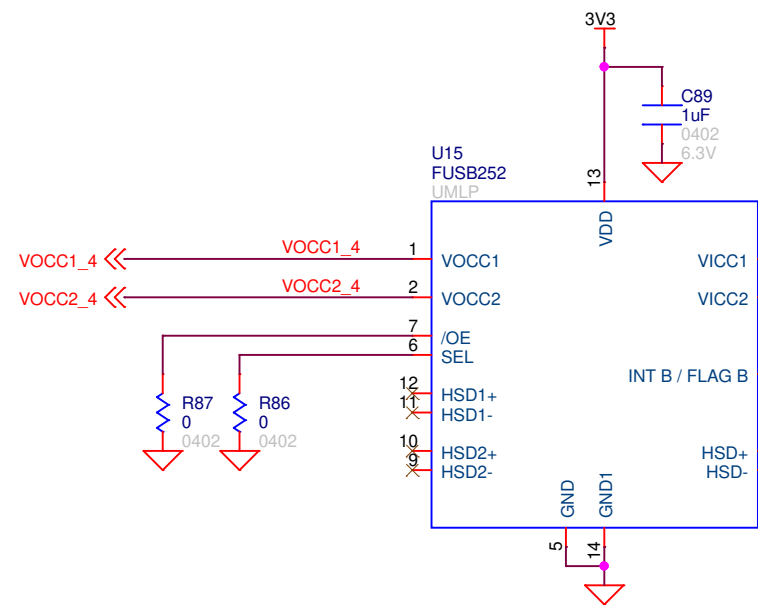
OVER-VOLTAGE PROTECTION



USB TYPE-C RECEPTACLE

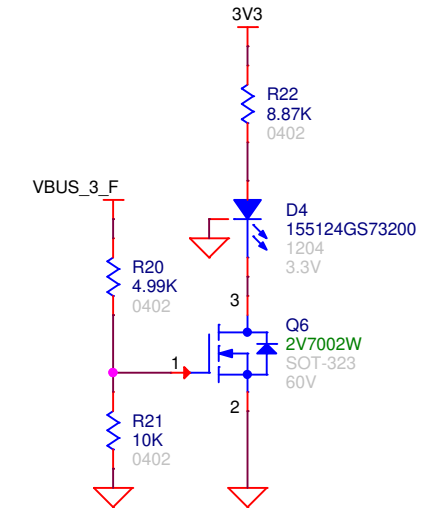


OVER-VOLTAGE PROTECTION

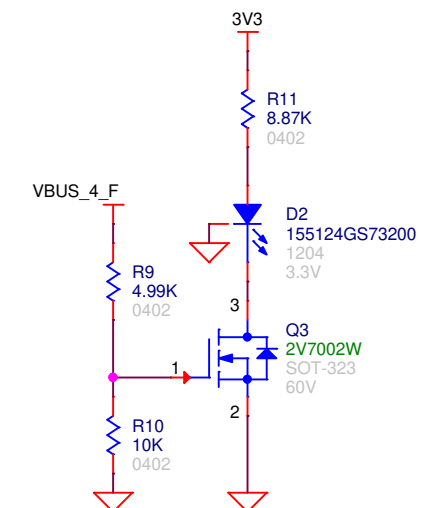


Indicator Optional for Customer Design

OUTPUT VOLTAGE INDICATOR



OUTPUT VOLTAGE INDICATOR

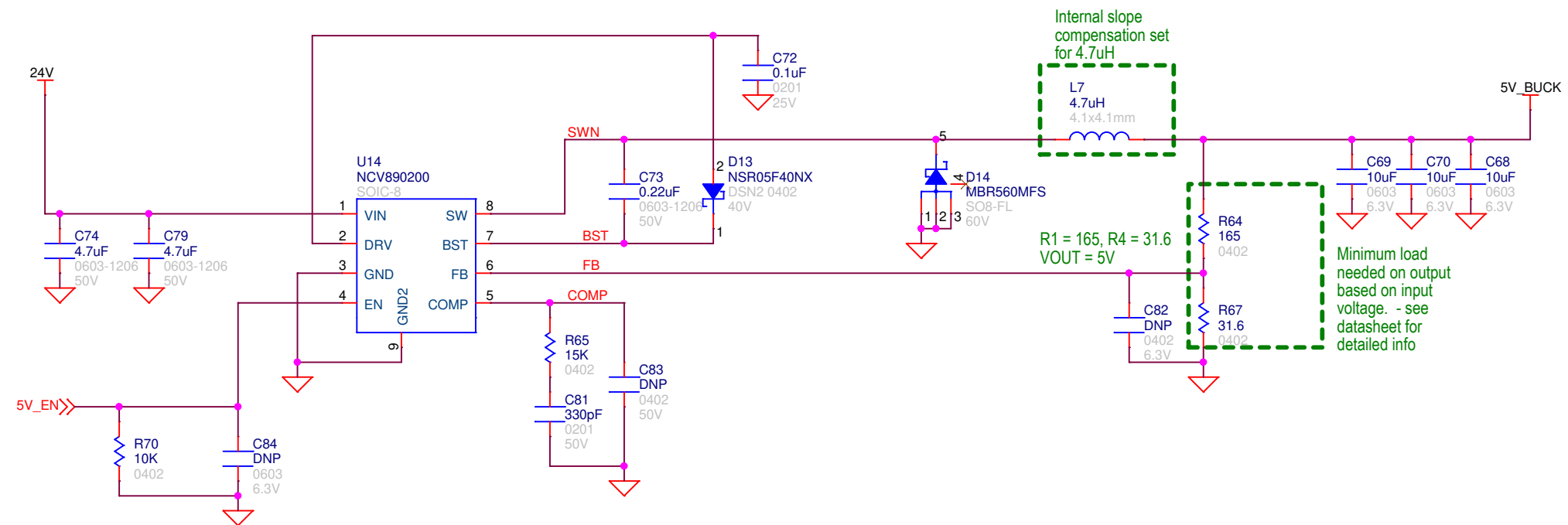


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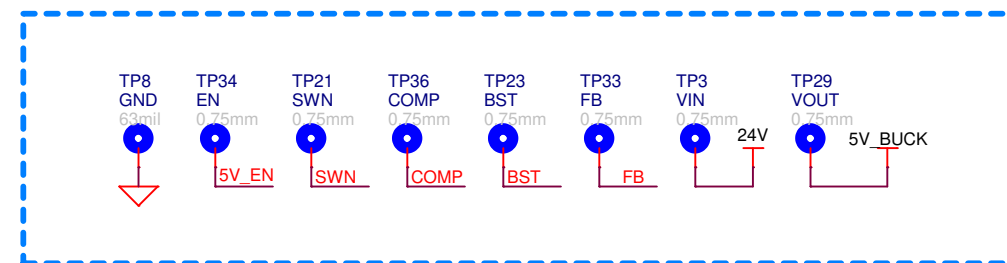
Title FUSB252 and USBC Connector 2		
Size Custom	Document Number ONSEC-17-038	Rev REV2
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NCV890200 5V Regulator

5V / 2A NON-SYNCHRONOUS BUCK



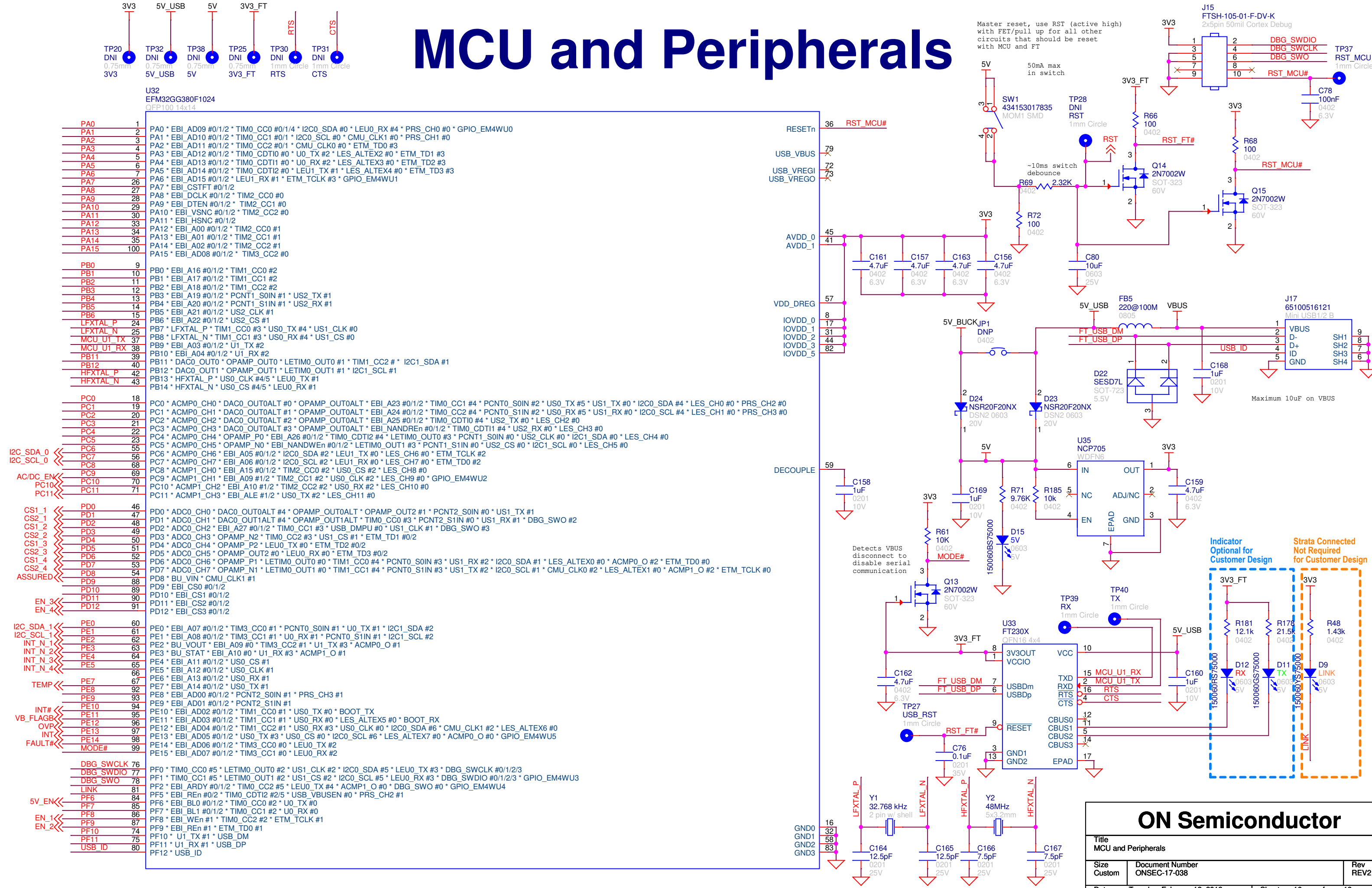
Test Circuitry Optional for Customer Design



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Title NCV890200 5V Regulator		
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MCU and Peripherals

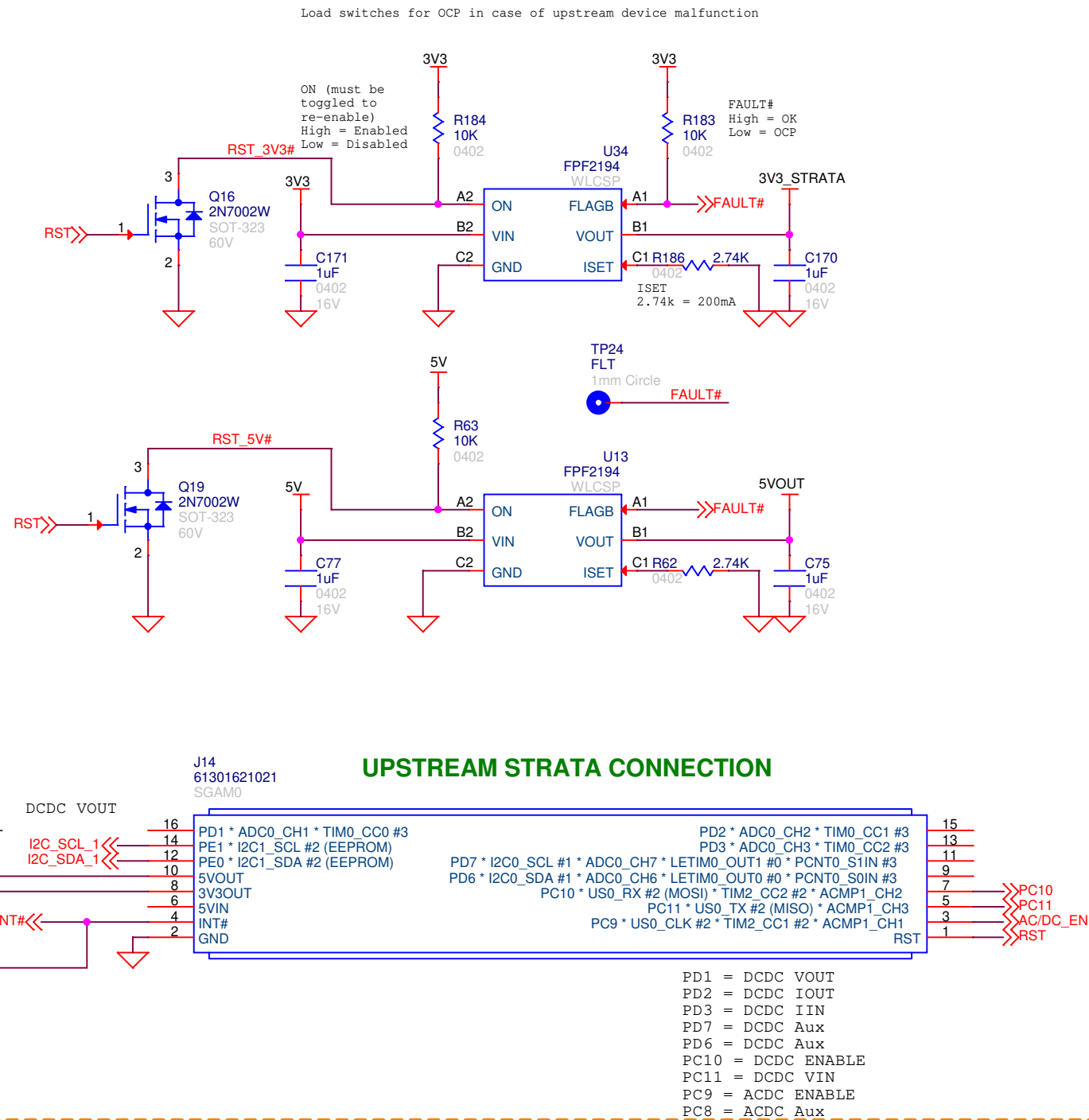


Pin	MCU Pin	Function
PA0	1	PA0 * EBI_AD09 #0/1/2 * TIM0_CC0 #0/1/4 * I2C0_SDA #0 * LEU0_RX #4 * PRS_CH0 #0 * GPIO_EM4WU0
PA1	2	PA1 * EBI_AD10 #0/1/2 * TIM0_CC1 #0/1 * I2C0_SCL #0 * CMU_CLK1 #0 * PRS_CH1 #0
PA2	3	PA2 * EBI_AD11 #0/1/2 * TIM0_CC2 #0/1 * CMU_CLK0 #0 * ETM_TD0 #3
PA3	4	PA3 * EBI_AD12 #0/1/2 * TIM0_CDTI0 #0 * U0_TX #2 * LES_ALTEX2 #0 * ETM_TD1 #3
PA4	5	PA4 * EBI_AD13 #0/1/2 * TIM0_CDTI1 #0 * U0_RX #2 * LES_ALTEX3 #0 * ETM_TD2 #3
PA5	6	PA5 * EBI_AD14 #0/1/2 * TIM0_CDTI2 #0 * LEU1_TX #1 * LES_ALTEX4 #0 * ETM_TD3 #3
PA6	7	PA6 * EBI_AD15 #0/1/2 * LEU1_RX #1 * ETM_TCLK #3 * GPIO_EM4WU1
PA7	26	PA7 * EBI_CSTFT #0/1/2
PA8	27	PA8 * EBI_DCLK #0/1/2 * TIM2_CC0 #0
PA9	28	PA9 * EBI_DTEN #0/1/2 * TIM2_CC1 #0
PA10	29	PA10 * EBI_VSNC #0/1/2 * TIM2_CC2 #0
PA11	30	PA11 * EBI_HSNC #0/1/2
PA12	33	PA12 * EBI_A00 #0/1/2 * TIM2_CC0 #1
PA13	34	PA13 * EBI_A01 #0/1/2 * TIM2_CC1 #1
PA14	35	PA14 * EBI_A02 #0/1/2 * TIM2_CC2 #1
PA15	100	PA15 * EBI_AD08 #0/1/2 * TIM3_CC2 #0
PB0	9	PB0 * EBI_A16 #0/1/2 * TIM1_CC0 #2
PB1	10	PB1 * EBI_A17 #0/1/2 * TIM1_CC1 #2
PB2	11	PB2 * EBI_A18 #0/1/2 * TIM1_CC2 #2
PB3	12	PB3 * EBI_A19 #0/1/2 * PCNT1_S0IN #1 * US2_TX #1
PB4	13	PB4 * EBI_A20 #0/1/2 * PCNT1_S1IN #1 * US2_RX #1
PB5	14	PB5 * EBI_A21 #0/1/2 * US2_CLK #1
PB6	15	PB6 * EBI_A22 #0/1/2 * US2_CS #1
LFXLAL_P	24	PB7 * LFXLAL_P * TIM1_CC0 #3 * US0_TX #4 * US1_CLK #0
LFXLAL_N	25	PB8 * LFXLAL_N * TIM1_CC1 #3 * US0_RX #4 * US1_CS #0
MCU_U1_TX	37	PB9 * EBI_A03 #0/1/2 * U1_TX #2
MCU_U1_RX	38	PB10 * EBI_A04 #0/1/2 * U1_RX #2
PB11	39	PB11 * DAC0_OUT0 * OPAMP_OUT0 * LETIM0_OUT0 #1 * TIM1_CC2 # * I2C1_SDA #1
PB12	40	PB12 * DAC0_OUT1 * OPAMP_OUT1 * LETIM0_OUT1 #1 * I2C1_SCL #1
HFXLAL_P	42	PB13 * HFXLAL_P * US0_CLK #4/5 * LEU0_TX #1
HFXLAL_N	43	PB14 * HFXLAL_N * US0_CS #4/5 * LEU0_RX #1
PC0	18	PC0 * ACMP0_CH0 * DAC0_OUT0ALT #0 * OPAMP_OUT0ALT * EBI_A23 #0/1/2 * TIM0_CC1 #4 * PCNT0_S0IN #2 * US0_TX #5 * US1_TX #0 * I2C0_SDA #4 * LES_CH0 #0 * PRS_CH2 #0
PC1	19	PC1 * ACMP0_CH1 * DAC0_OUT0ALT #1 * OPAMP_OUT0ALT * EBI_A24 #0/1/2 * TIM0_CC2 #4 * PCNT0_S1IN #2 * US0_RX #5 * US1_RX #0 * I2C0_SCL #4 * LES_CH1 #0 * PRS_CH3 #0
PC2	20	PC2 * ACMP0_CH2 * DAC0_OUT0ALT #2 * OPAMP_OUT0ALT * EBI_A25 #0/1/2 * TIM0_CDTI0 #4 * US2_TX #0 * LES_CH2 #0
PC3	21	PC3 * ACMP0_CH3 * DAC0_OUT0ALT #3 * OPAMP_OUT0ALT * EBI_NANDREN #0/1/2 * TIM0_CDTI1 #4 * US2_RX #0 * LES_CH3 #0
PC4	22	PC4 * ACMP0_CH4 * OPAMP_P0 * EBI_A26 #0/1/2 * TIM0_CDTI2 #4 * LETIM0_OUT0 #3 * PCNT1_S0IN #0 * US2_CLK #0 * I2C1_SDA #0 * LES_CH4 #0
PC5	23	PC5 * ACMP0_CH5 * OPAMP_P0 * EBI_A26 #0/1/2 * TIM0_CDTI2 #4 * LETIM0_OUT0 #3 * PCNT1_S0IN #0 * US2_CLK #0 * I2C1_SCL #0 * LES_CH5 #0
I2C_SDA_0	55	PC6 * ACMP0_CH6 * OPAMP_N0 * EBI_NANDWEN #0/1/2 * LETIM0_OUT1 #1 * TIM0_CDTI1 #3 * PCNT1_S1IN #0 * US2_CS #0 * I2C1_SDA #0 * LES_CH6 #0
I2C_SCL_0	56	PC7 * ACMP0_CH7 * EBI_A06 #0/1/2 * I2C0_SCL #2 * LEU1_RX #0 * LES_CH7 #0 * ETM_TD0 #2
AC/DC_EN	68	PC8 * ACMP1_CH0 * EBI_A15 #0/1/2 * TIM2_CC0 #2 * US0_CS #2 * LES_CH8 #0
PC10	69	PC9 * ACMP1_CH1 * EBI_A09 #1/2 * TIM2_CC1 #2 * US0_CLK #2 * LES_CH9 #0 * GPIO_EM4WU2
PC11	70	PC10 * ACMP1_CH2 * EBI_A10 #1/2 * TIM2_CC2 #2 * US0_RX #2 * LES_CH10 #0
PC11	71	PC11 * ACMP1_CH3 * EBI_ALE #1/2 * US0_TX #2 * LES_CH11 #0
CS1_1	PD0	PD0 * ADC0_CH0 * DAC0_OUT0ALT #4 * OPAMP_OUT0ALT * OPAMP_OUT2 #1 * PCNT2_S0IN #0 * US1_TX #1
CS2_1	PD1	PD1 * ADC0_CH1 * DAC0_OUT1ALT #4 * OPAMP_OUT1ALT * TIM0_CC0 #3 * PCNT2_S1IN #0 * US1_RX #1 * DBG_SWO #2
CS1_2	PD2	PD2 * ADC0_CH2 * EBI_A27 #0/1/2 * TIM0_CC1 #3 * USB_DMPU #0 * US1_CLK #1 * DBG_SWO #3
CS2_2	PD3	PD3 * ADC0_CH3 * OPAMP_N2 * TIM0_CC2 #3 * US1_CS #1 * ETM_TD1 #0/2
CS1_3	PD4	PD4 * ADC0_CH4 * OPAMP_P2 * LEU0_TX #0 * ETM_TD2 #0/2
CS2_3	PD5	PD5 * ADC0_CH5 * OPAMP_OUT2 #0 * LEU0_RX #0 * ETM_TD3 #0/2
CS1_4	PD6	PD6 * ADC0_CH6 * OPAMP_P1 * LETIM0_OUT0 #0 * TIM1_CC0 #4 * PCNT0_S0IN #3 * US1_RX #2 * I2C0_SDA #1 * LES_ALTEX0 #0 * ACMP0_O #2 * ETM_TD0 #0
CS2_4	PD7	PD7 * ADC0_CH7 * OPAMP_N1 * LETIM0_OUT1 #0 * TIM1_CC1 #4 * PCNT0_S1IN #3 * US1_TX #2 * I2C0_SCL #1 * CMU_CLK0 #2 * LES_ALTEX1 #0 * ACMP1_O #2 * ETM_TCLK #0
ASSURED	PD8	PD8 * BU_VIN * CMU_CLK1 #1
EN_3	PD9	PD9 * EBI_CS0 #0/1/2
EN_4	PD10	PD10 * EBI_CS1 #0/1/2
PD11	90	PD11 * EBI_CS2 #0/1/2
PD12	91	PD12 * EBI_CS3 #0/1/2
I2C_SDA_1	PE0	PE0 * EBI_A07 #0/1/2 * TIM3_CC0 #1 * PCNT0_S0IN #1 * U0_TX #1 * I2C1_SDA #2
I2C_SCL_1	PE1	PE1 * EBI_A08 #0/1/2 * TIM3_CC1 #1 * U0_RX #1 * PCNT0_S1IN #1 * I2C1_SCL #2
INT_N_1	PE2	PE2 * BU_VOUT * EBI_A09 #0 * TIM3_CC2 #1 * U1_TX #3 * ACMP0_O #1
INT_N_2	PE3	PE3 * BU_STAT * EBI_A10 #0 * U1_RX #3 * ACMP1_O #1
INT_N_3	PE4	PE4 * EBI_A11 #0/1/2 * US0_CS #1
INT_N_4	PE5	PE5 * EBI_A12 #0/1/2 * US0_CLK #1
TEMP	PE6	PE6 * EBI_A13 #0/1/2 * US0_RX #1
PE7	92	PE7 * EBI_A14 #0/1/2 * US0_TX #1
PE8	93	PE8 * EBI_AD00 #0/1/2 * PCNT2_S0IN #1 * PRS_CH3 #1
PE9	94	PE9 * EBI_AD01 #0/1/2 * PCNT2_S1IN #1
INT#	PE10	PE10 * EBI_AD02 #0/1/2 * TIM1_CC0 #1 * US0_TX #0 * BOOT_TX
VB_FLAGB	PE11	PE11 * EBI_AD03 #0/1/2 * TIM1_CC1 #1 * US0_RX #0 * LES_ALTEX5 #0 * BOOT_RX
OVR	PE12	PE12 * EBI_AD04 #0/1/2 * TIM1_CC2 #1 * US0_RX #3 * US0_CLK #0 * I2C0_SDA #6 * CMU_CLK1 #2 * LES_ALTEX6 #0
INT	PE13	PE13 * EBI_AD05 #0/1/2 * US0_TX #3 * US0_CS #0 * I2C0_SCL #6 * LES_ALTEX7 #0 * ACMP0_O #0 * GPIO_EM4WU5
FAULT#	PE14	PE14 * EBI_AD06 #0/1/2 * TIM3_CC0 #0 * LEU0_TX #2
PE15	99	PE15 * EBI_AD07 #0/1/2 * TIM3_CC1 #0 * LEU0_RX #2
DBG_SWCLK	76	PF0 * TIM0_CC0 #5 * LETIM0_OUT0 #2 * US1_CLK #2 * I2C0_SDA #5 * LEU0_TX #3 * DBG_SWCLK #0/1/2/3
DBG_SWIO	77	PF1 * TIM0_CC1 #5 * LETIM0_OUT1 #2 * US1_CS #2 * I2C0_SCL #5 * LEU0_RX #3 * DBG_SWIO #0/1/2/3 * GPIO_EM4WU3
DBG_SWO	78	PF2 * EBI_ARDY #0/1/2 * TIM0_CC2 #5 * LEU0_TX #4 * ACMP1_O #0 * DBG_SWO #0 * GPIO_EM4WU4
LINK	81	PF5 * EBI_REn #0/2 * TIM0_CDTI2 #2/5 * USB_VBUSEN #0 * PRS_CH2 #1
PF6	84	PF6 * EBI_BLO #0/1/2 * TIM0_CC0 #2 * U0_TX #0
PF7	85	PF7 * EBI_BL1 #0/1/2 * TIM0_CC1 #2 * U0_RX #0
EN_1	PF8	PF8 * EBI_WEn #1 * TIM0_CC2 #2 * ETM_TCLK #1
EN_2	PF9	PF9 * EBI_REn #1 * ETM_TD0 #1
PF10	74	PF10 * U1_TX #1 * USB_DM
PF11	75	PF11 * U1_RX #1 * USB_DP
USB_ID	80	PF12 * USB_ID

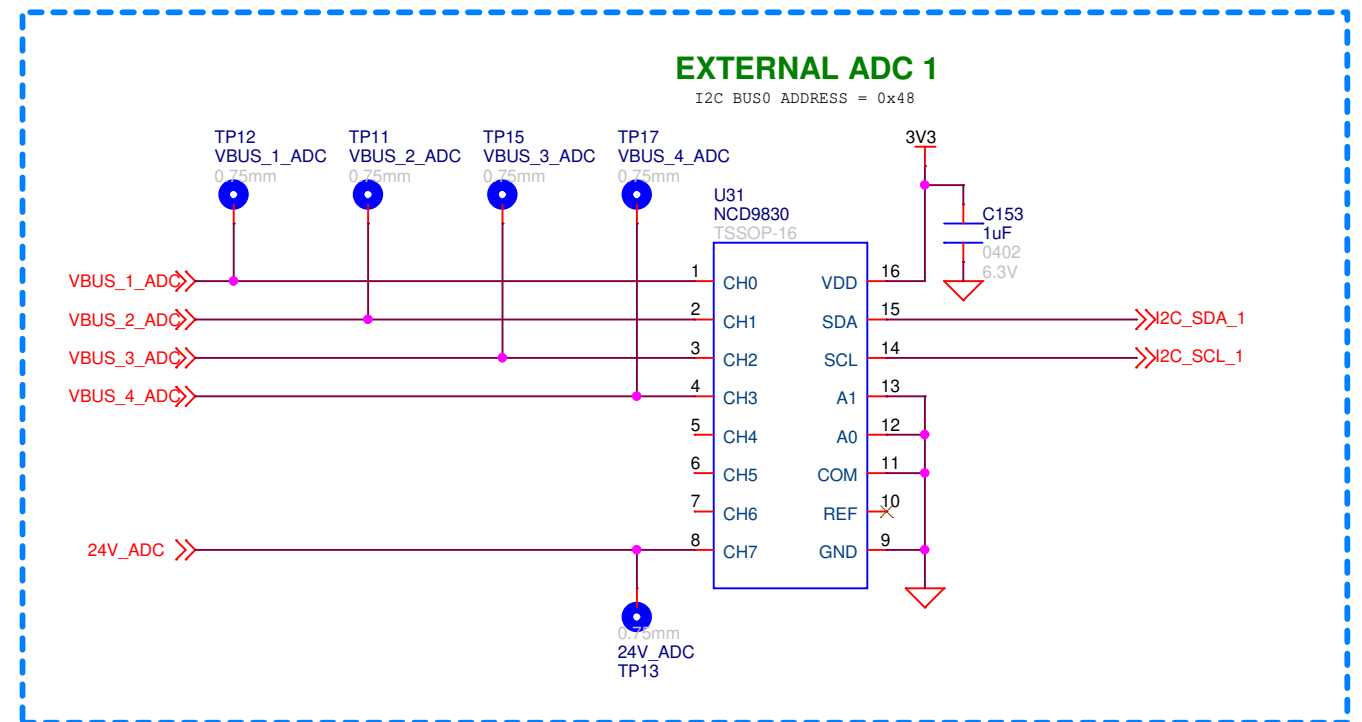
ON Semiconductor		
Title MCU and Peripherals		
Size Custom	Document Number ONSEC-17-038	Rev REV2
Date: Tuesday, February 12, 2019	Sheet 16	of 18

STRATA CONN & ADC

Strata Connected
Not Required for Customer Design



Telemetry
Optional for Customer Design



Minimum MCU Requirements:

- Bit-width: 32-bit, 16-bit or 8-bit require significant porting effort and increase code size
- Speed: 12 MHz
- Flash: 32 kB - 128 kB depending on feature set and optimizations
- RAM: 2 kB per port + additional if logging is required
- Peripherals: (1) I2C - 1MHz recommended (2) Timers - 32-bit w/ 1us resolution & 16-bit w/ 1ms resolution, 8-bit ADC if using telemetry, (2) GPIO with falling-edge interrupt capability

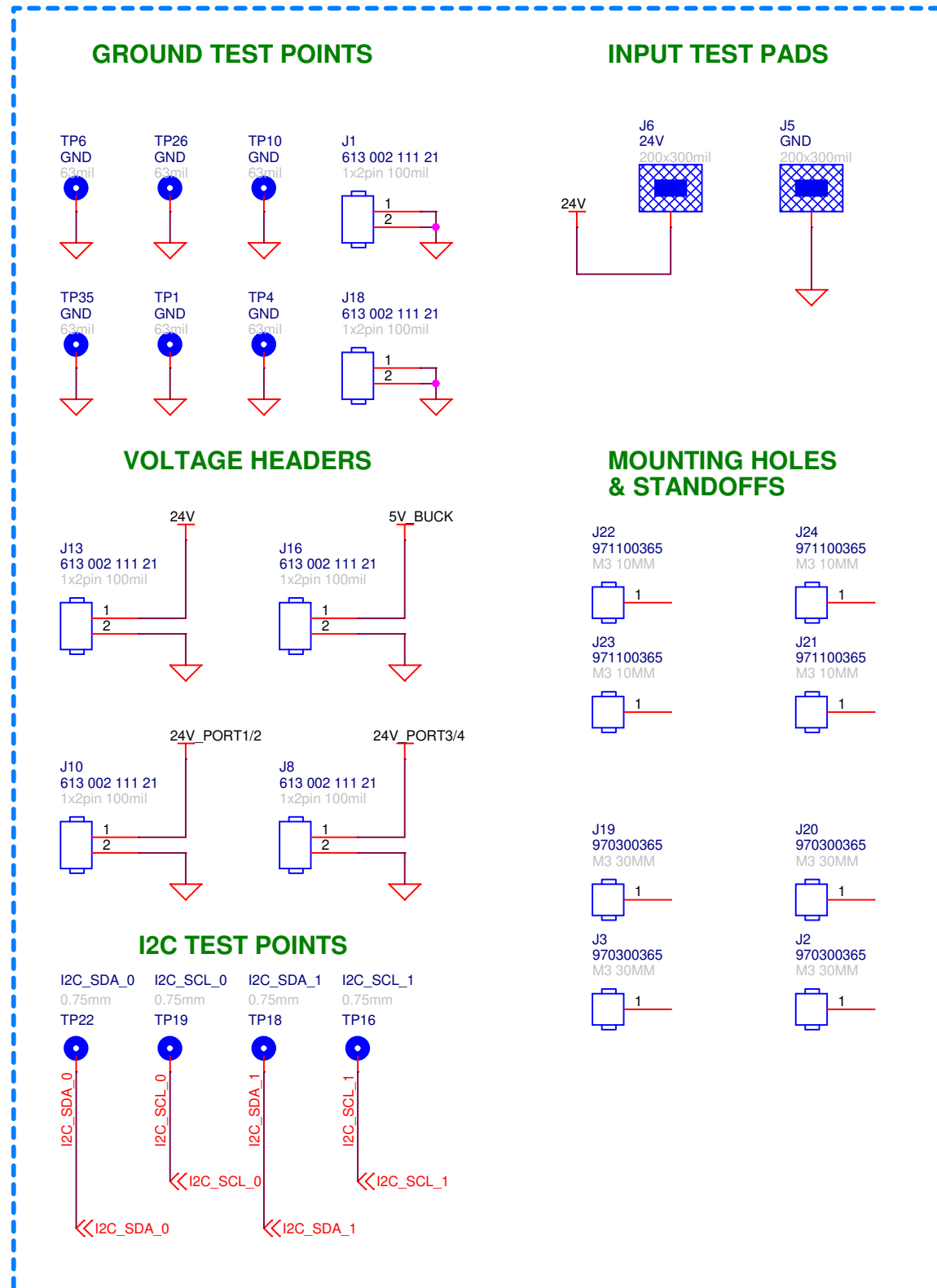
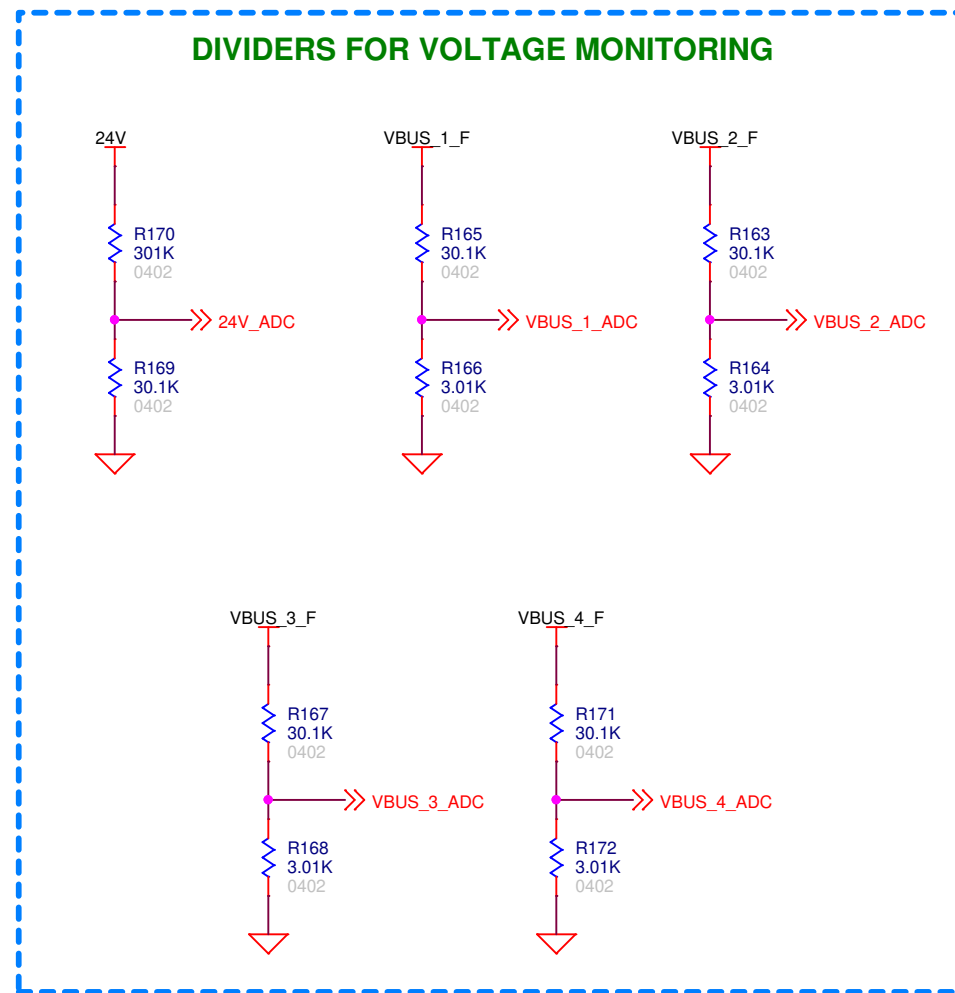
ON Semiconductor

Title STRATA CONN & ADC		
Size Custom	Document Number ONSEC-17-038	Rev REV2
Date: Wednesday, February 13, 2019	Sheet 17	of 18

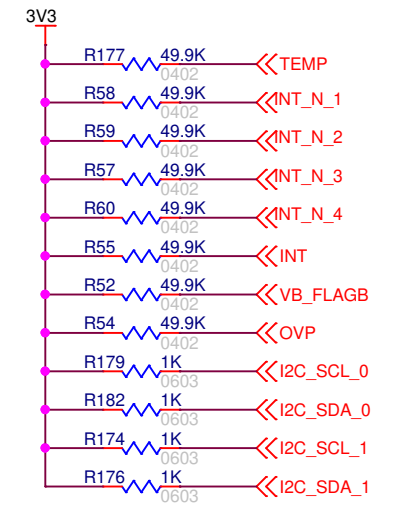
Test Circuitry

Test Circuitry Optional for Customer Design

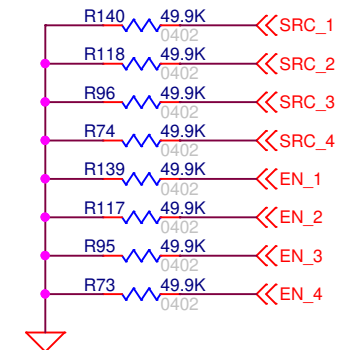
Telemetry Optional for Customer Design



PULL UPS



PULL DOWNS



ON Semiconductor

Title Test Circuitry		
Size Custom	Document Number ONSEC-17-038	Rev REV2
Date: Tuesday, February 12, 2019	Sheet 18	of 18



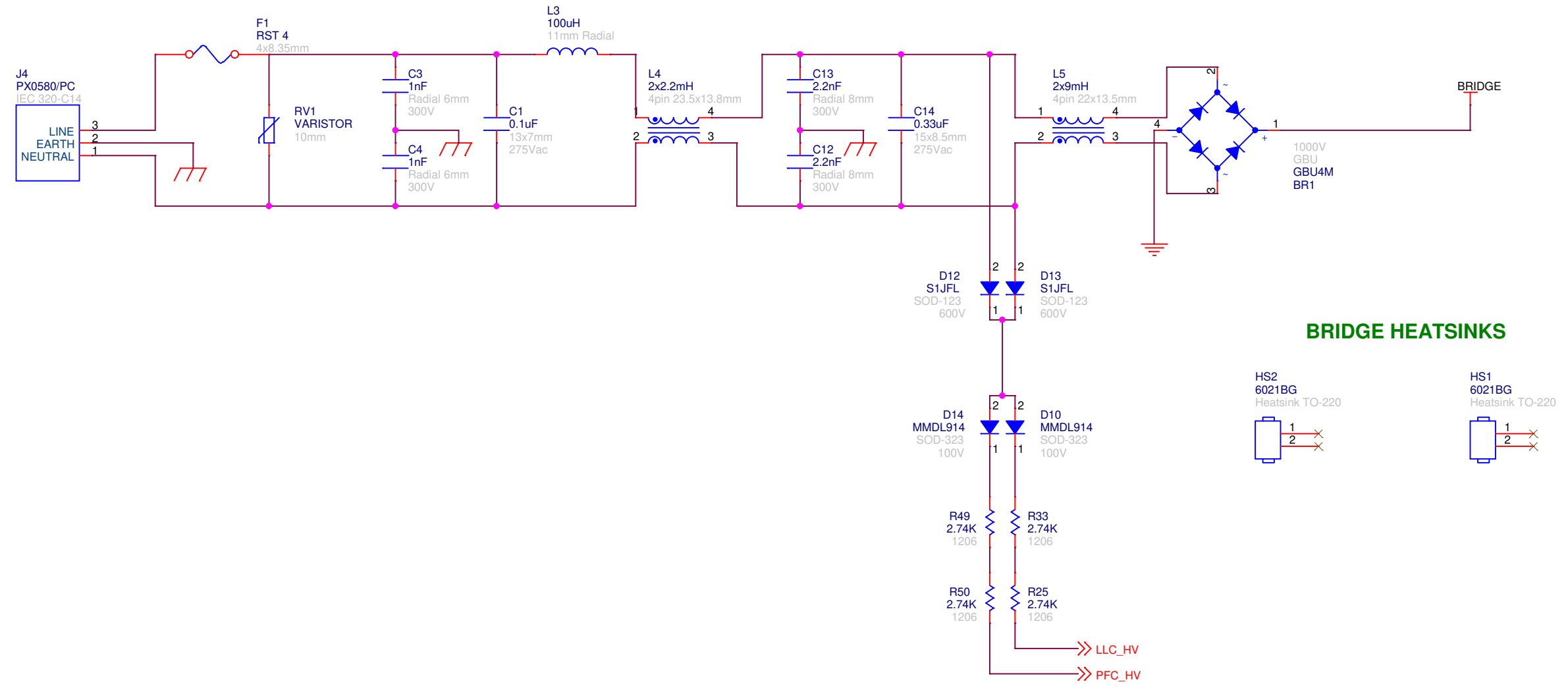
ON Semiconductor®
200W LLC w/ PFC

Comment Legend

- Description
- Optional
- Not Required

ON Semiconductor		
Title 200W LLC w/ PFC		
Size Custom	Document Number ONSEC-18-022	Rev REV1
Date: Thursday, February 14, 2019	Sheet 1	of 7

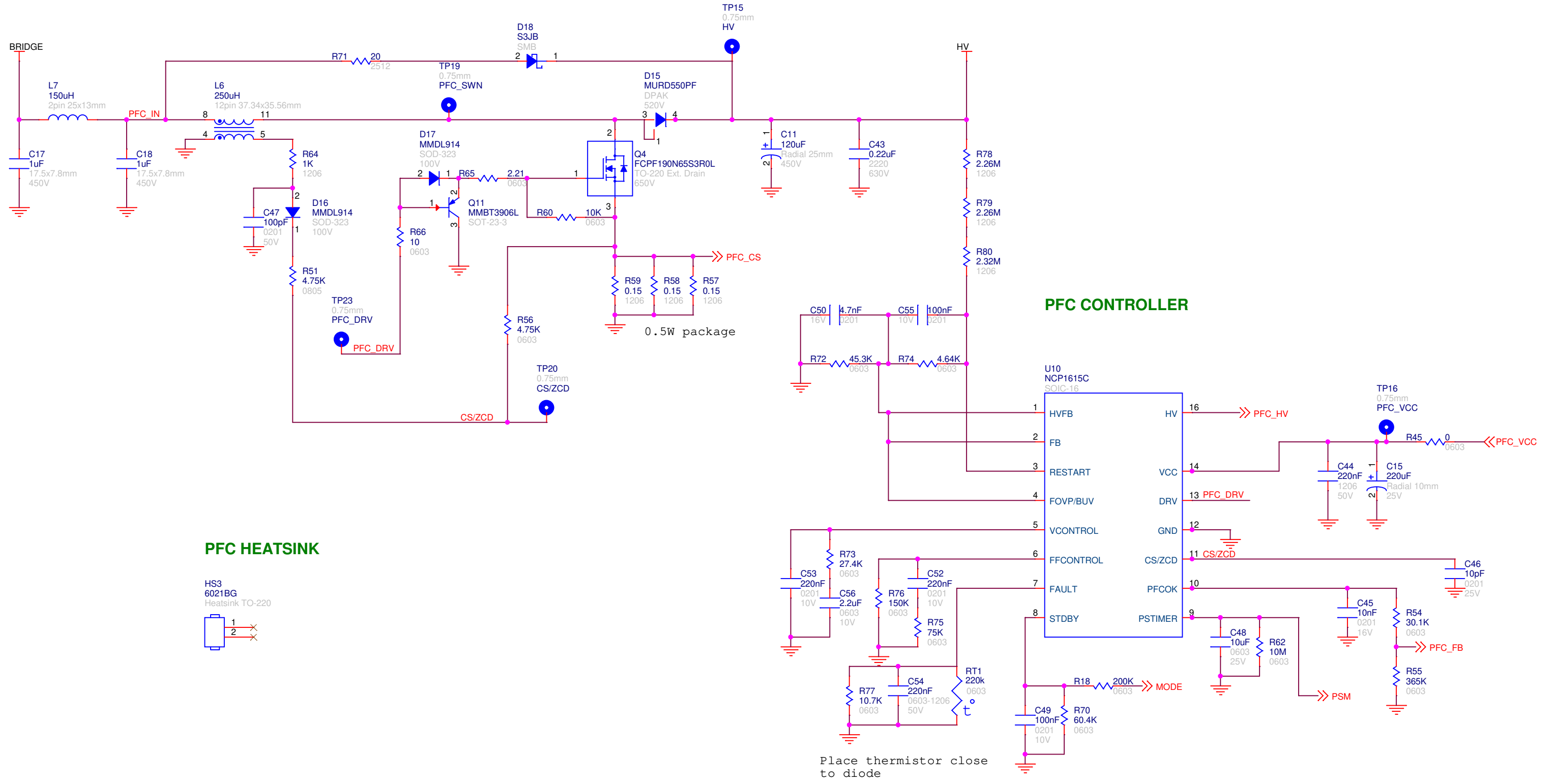
EMI Filter



ON Semiconductor

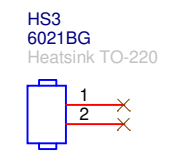
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Size Custom	Document Number ONSEC-18-022	Rev REV1
Date: Thursday, February 14, 2019	Sheet 2	of 7

PFC



PFC CONTROLLER

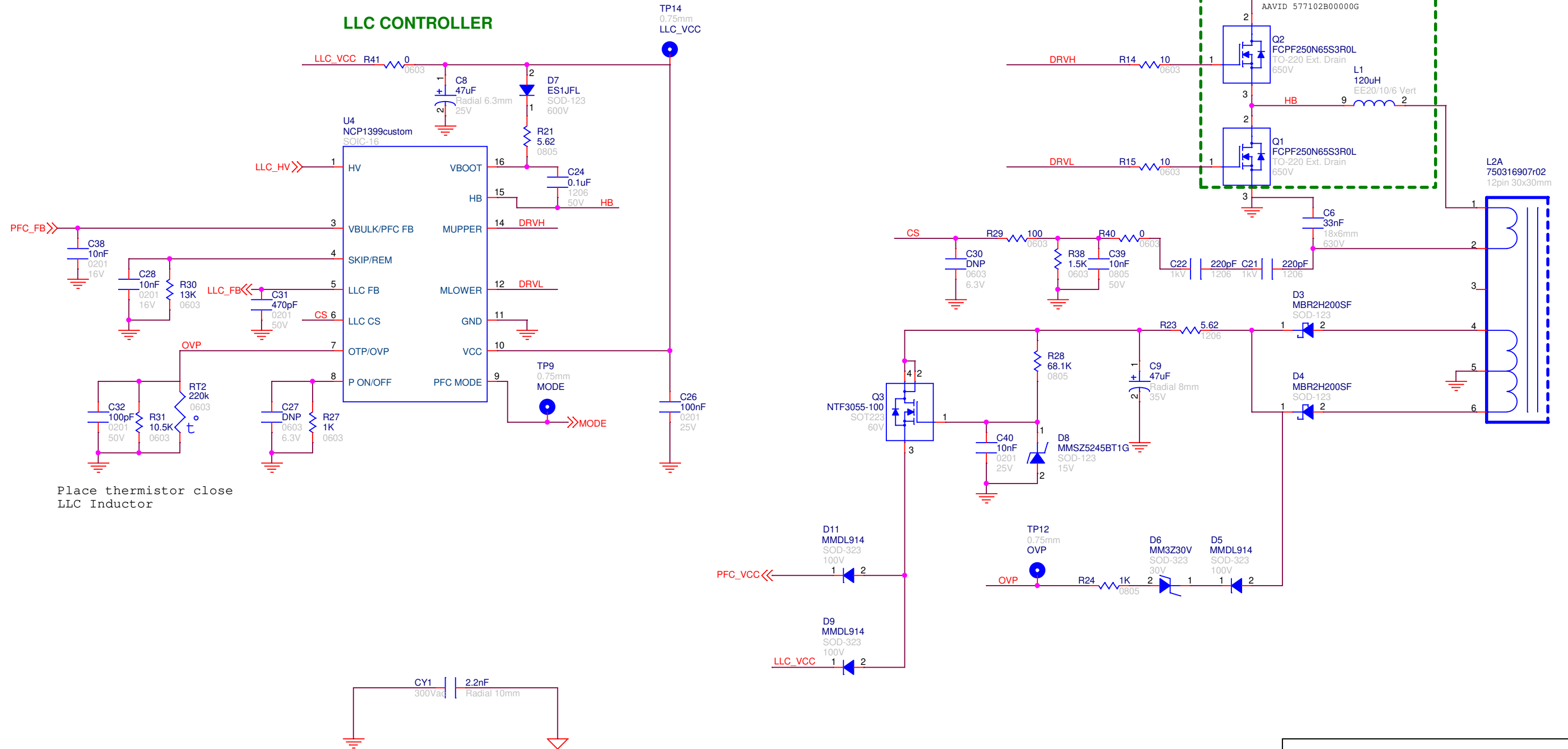
PFC HEATSINK



Place thermistor close to diode

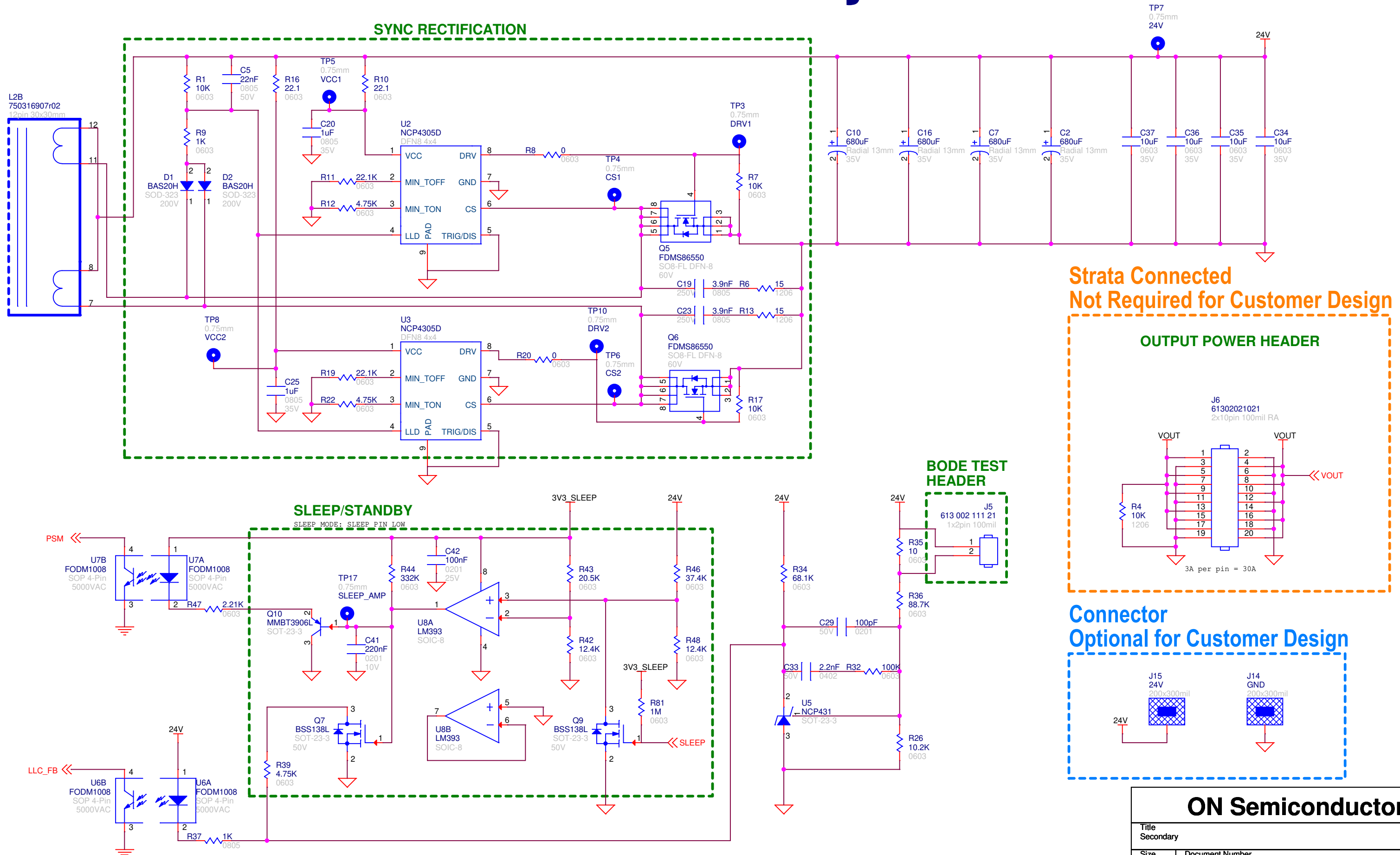
ON Semiconductor		
Title PFC		
Size Custom	Document Number ONSEC-18-022	Rev REV1
Date: Thursday, February 14, 2019	Sheet 3	of 7

Primary

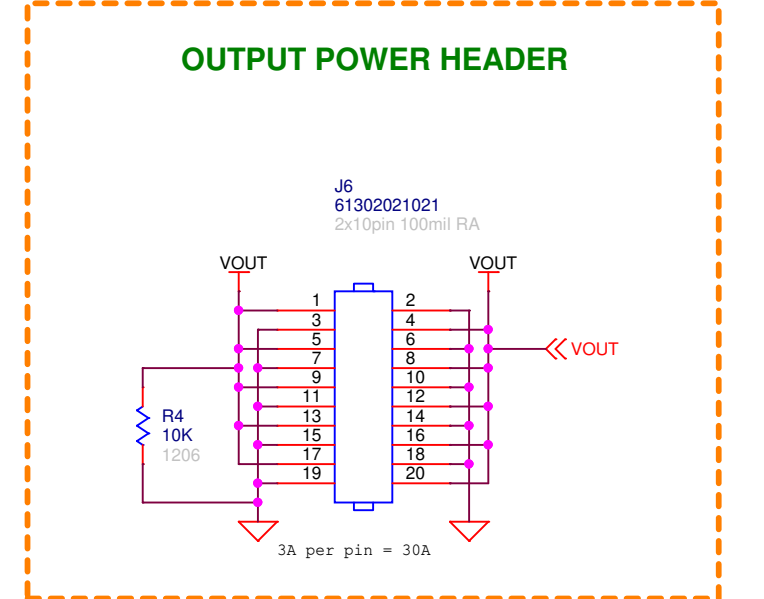


ON Semiconductor		
Title Primary		
Size Custom	Document Number ONSEC-18-022	Rev REV1
Date: Thursday, February 14, 2019	Sheet 4	of 7

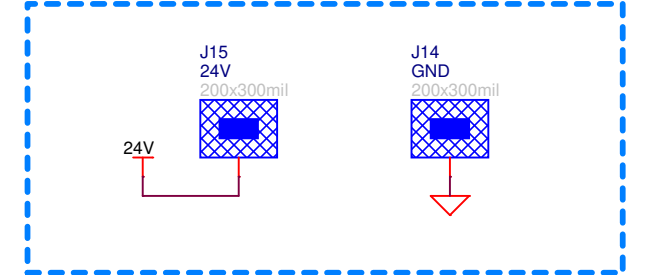
Secondary



Strata Connected
Not Required for Customer Design



Connector
Optional for Customer Design

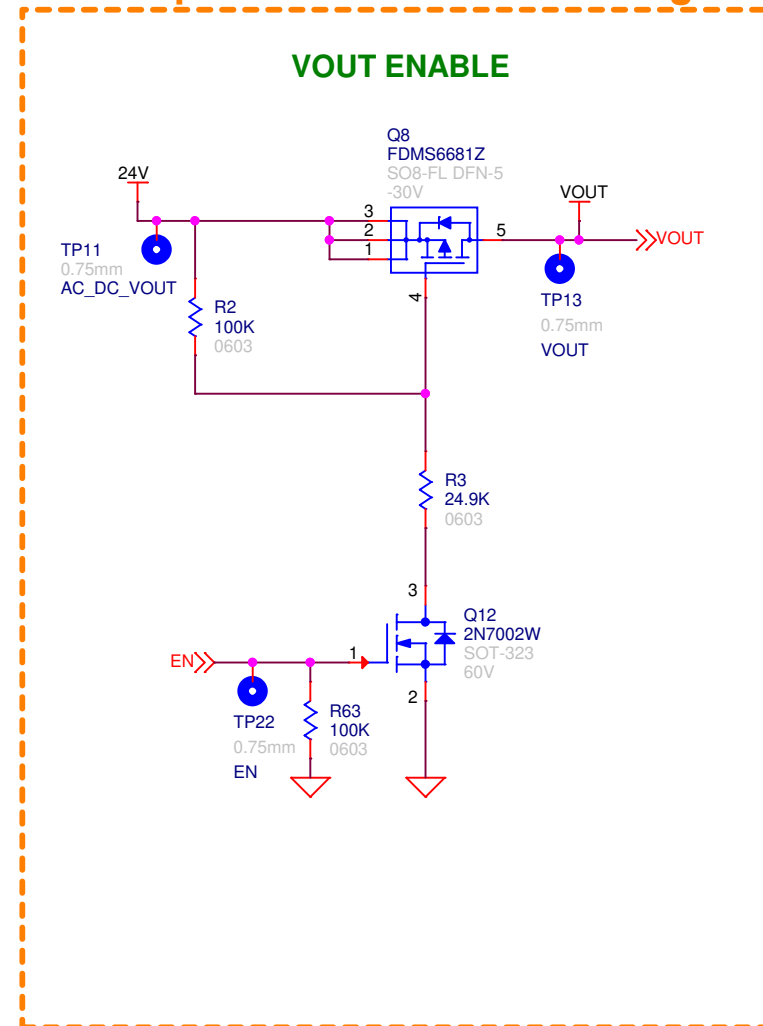


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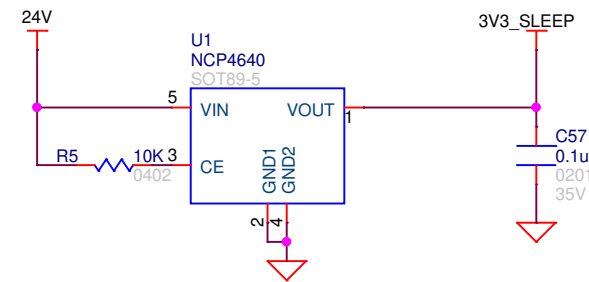
Title Secondary		
Size Custom	Document Number ONSEC-18-022	Rev REV1
Date: Thursday, February 14, 2019	Sheet 5	of 7

Test Circuitry

Strata Connected
Not Required for Customer Design

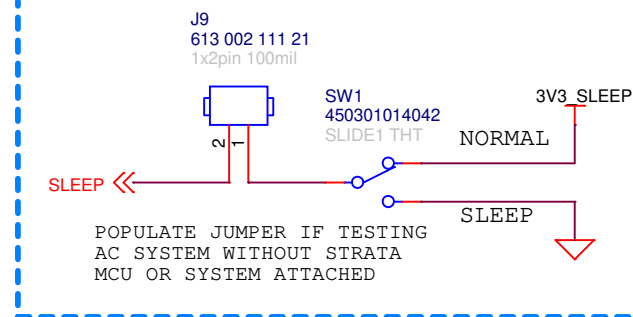


SLEEP STATE LDO



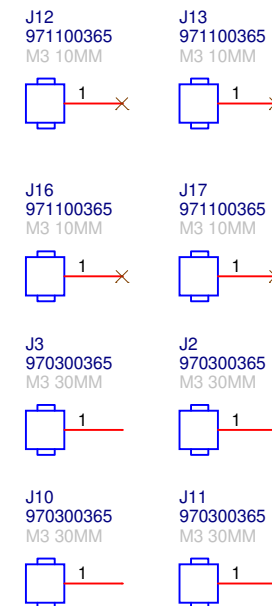
Test Switch
Optional for Customer Design

SLEEP STATE TEST SWITCH

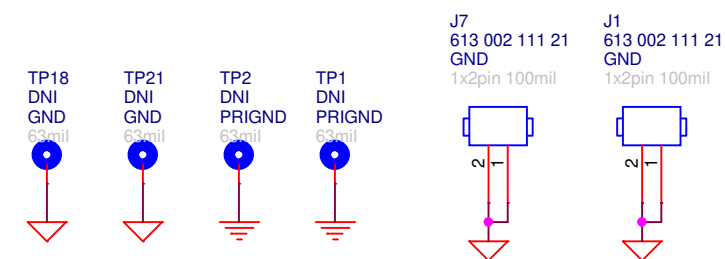


Strata Connected
Not Required for Customer Design

MOUNTING HOLES



GROUND HEADERS



ON Semiconductor

Title Test Circuitry		
Size Custom	Document Number ONSEC-18-022	Rev REV1
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Strata Connection

Strata Connected
Not Required for Customer Design

