1. All resistors 0603 1% 1/8W SMT unless otherwise specified

2. All capacitors 0603 10% 50V X7R SMT unless otherwise specified

Power Regulation
Power Regulation.SchDoc

Microcontroller
Microcontroller.SchDoc

All RF traces after matching network 50 ohm microstrip

RFID Reader
RFID Reader.SchDoc

Switch Network
Switch Network.SchDoc

Antenna Connectors
Antenna Connectors.SchDoc

SEL[7..0]

UART_RFID_TX/IRQ_IN
UART_RFID_RX/IRQ_OUT
SPI_RFID_MOSI
SPI_RFID_MISO
SPI_RFID_CLK
SPI_RFID_CS
INTERFACE_PIN
ANTENNA_P
ANTENNA_N
RF[11..0]

MH1
M4 Mounting Hole

MH2
M4 Mounting Hole

MH3
M4 Mounting Hole

MH4
M4 Mounting Hole

Title		
Size: B	Number	Revision
Date: 12/03/2023		Sheet of
File: C:\Users\..\CBU.SchDoc		Drawn By:

Copied from ST app note DB2382 Rev 5

Table 4. **Select serial communication interface selection table**

Pin	SPI interface
SSI_0	1
SSI_1	0

Jumpers and NCs are from app note

EMI filter + matching network
27 ohm Zdiff to 50 ohm microstrip TL

CL = (C1*C2)/(C1+C2) + Cstray

ST25R95 Datasheet: CL = 6pF, Cstray = 2-7pF, C1 = C2 = 10-20pF

The math doesn't check out though, but I'll use the recommended CL = 6pF and C1=C2 = 10pF

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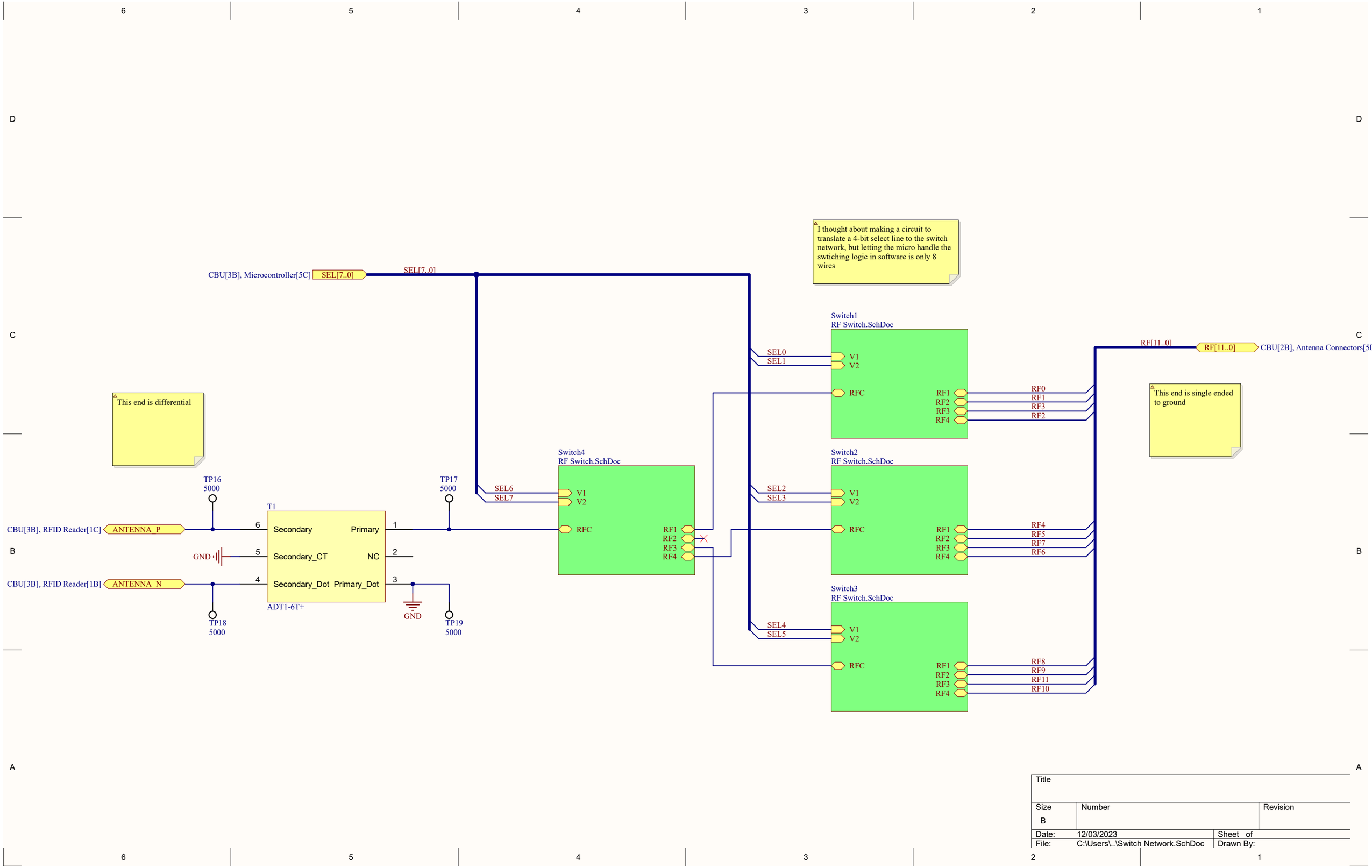
Size B	Number		Revision
Date:	12/03/2023	Sheet of	
File:	C:\Users\..\RFID Reader.SchDoc	Drawn By:	



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Date: 12/03/2023		Sheet of
File: C:\Users\..\Switch Network.SchDoc		Drawn By:

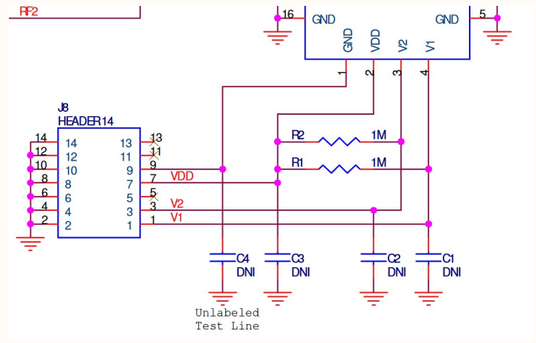
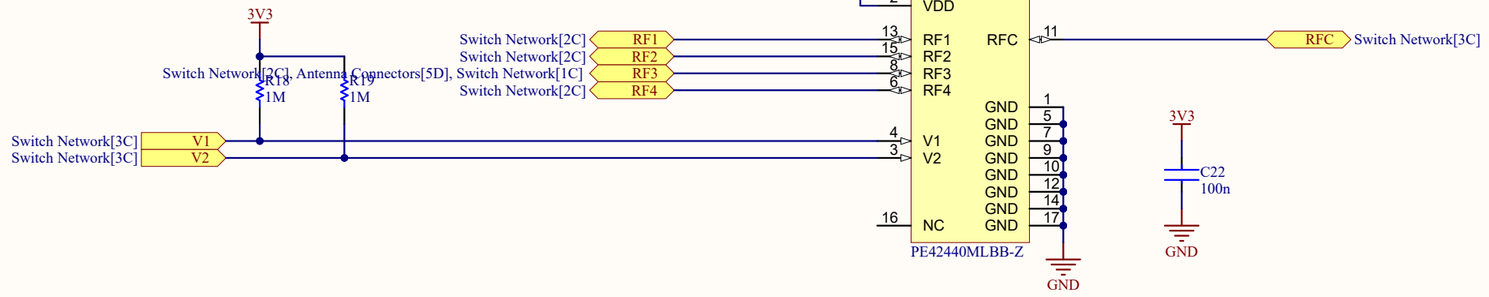


Table 4. Operating Ranges[4]

Parameter	Symbol	Min	Typ	Max	Units
V_{DD} Supply Voltage	V_{DD}	2.65	2.75	3.3	V

Removed DNI caps to ground, thye make routing difficult and won't be used



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Size: B	Number	Revision
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File: C:\Users\..\RF Switch.SchDoc	Drawn By:	

CBU[2B], RF Switch[4B], Switch Network[1C] RF[11..0]

RF[11..0]

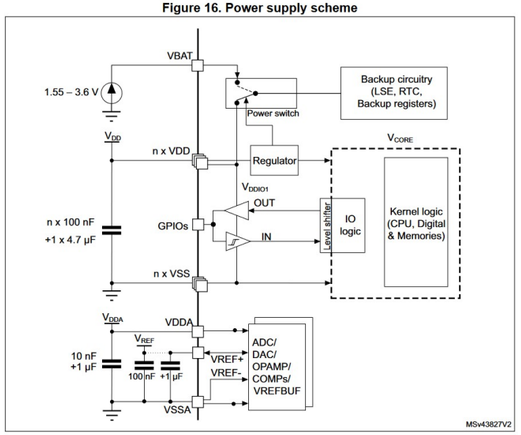
RF0
RF1
RF2
RF3
RF4
RF5
RF6
RF7
RF8
RF9
RF10
RF11

J1 731000114
J2 731000114
J3 731000114
J4 731000114
J5 731000114
J6 731000114
J7 731000114
J8 731000114
J9 731000114
J10 731000114
J11 731000114
J12 731000114

GND

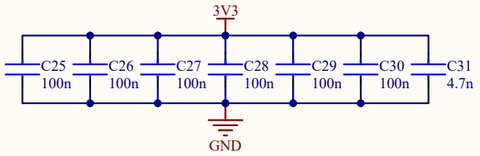
Title		
Size: B	Number	Revision
Date: 12/03/2023	Sheet of	
File: C:\Users\..\Antenna Connectors.SchDoc	Drawn By:	

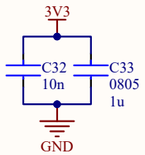
Figure 16. Power supply scheme



Each power supply pair (V_{DD}/V_{SS}, V_{DDA}/V_{SSA} etc.) must be decoupled with filtering ceramic capacitors as shown above. These capacitors must be placed as close as possible to, or below, the appropriate pins on the underside of the PCB to ensure the good functionality of the device.

Decoupling Caps



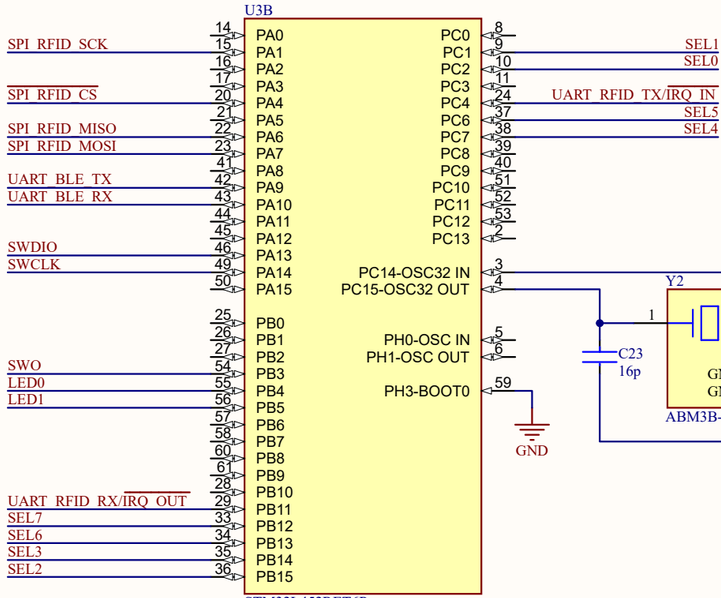


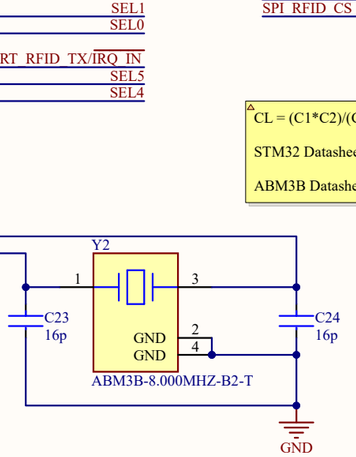
SPI_RFID_SCK — TP1 5000
SPI_RFID_MISO — TP2 5000
SPI_RFID_MOSI — TP3 5000
SPI_RFID_CS — TP4 5000
TP5 5000
GND

UART_BLE_TX — TP6 5000
UART_BLE_RX — TP7 5000
TP8 5000
GND

CBU[5B], Switch Network[5C] SEL[7..0] → SEL[7..0]: SEL0, SEL1, SEL2, SEL3, SEL4, SEL5, SEL6, SEL7, SEL8

SPI RFID: SPI1
UART BLE: USART1
UART RFID (prob not used): USART3





CL = (C1*C2)/(C1+C2) + Cstray

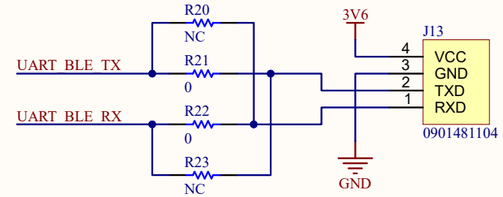
STM32 Datasheet pg 129: Cstray = 10pF

ABM3B Datasheet: CL = 18pF

UART_RFID_TX/IRQ_IN — UART_RFID_TX/IRQ_IN — CBU[5B], RFID Reader[6B]
UART_RFID_RX/IRQ_OUT — UART_RFID_RX/IRQ_OUT — CBU[5B], RFID Reader[6B]

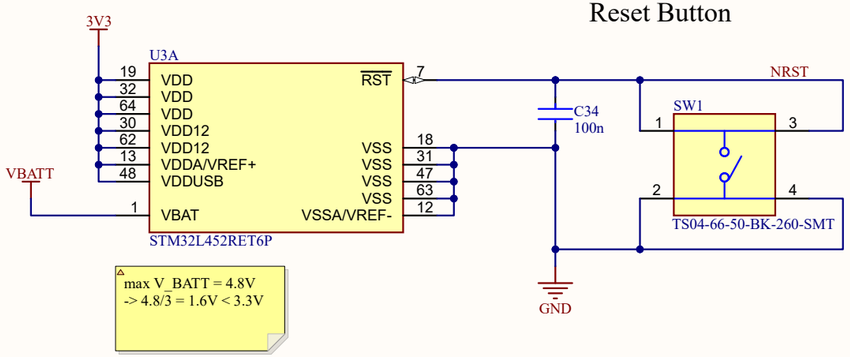
SPI_RFID_MOSI — SPI_RFID_MOSI — CBU[5B], RFID Reader[6B]
SPI_RFID_MISO — SPI_RFID_MISO — CBU[5B], RFID Reader[6B]
SPI_RFID_SCK — SPI_RFID_CLK — CBU[5B], RFID Reader[6B]
SPI_RFID_CS — SPI_RFID_CS — CBU[5B], RFID Reader[6B]

BLE Connector

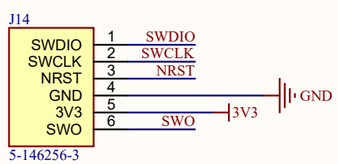


STM32 TX -> BLE RX and vice versa, jumpers for paranoia

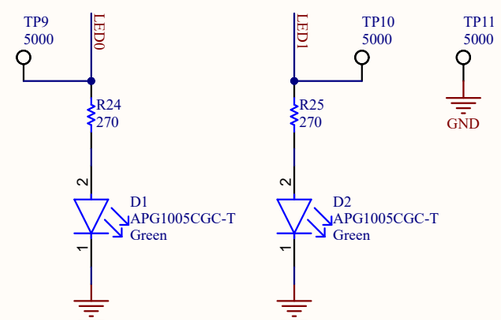
Reset Button

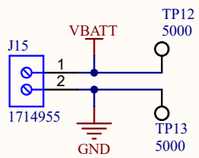


Programming Header



Software-Controlled LEDs

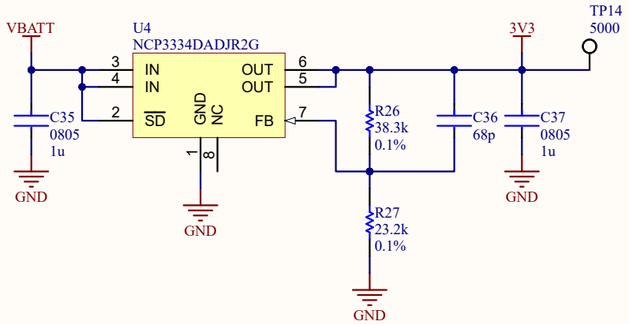




Assuming 3x AA batteries, 1.3V - 1.6V absolute range, VBATT = 3.9V - 4.8V

BLE requires 3.6V min, highest operating voltage

38.3k/23.2k -> 3.314V



Adjustable Operation

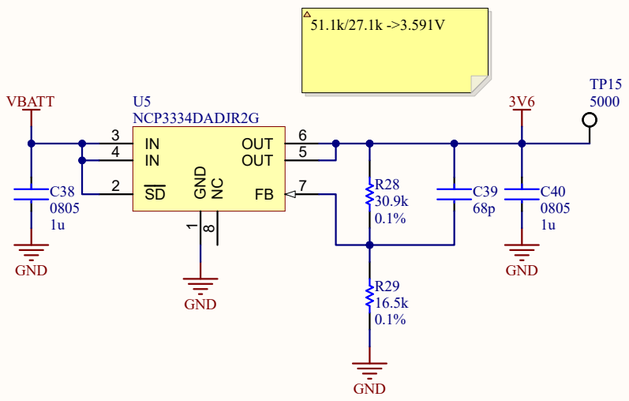
The output voltage can be set by using a resistor divider as shown in Figure 1 with a range of 1.25 to 10 V. The appropriate resistor divider can be found by solving the equation below. The recommended current through the resistor divider is from 10 µA to 100 µA. This can be accomplished by selecting resistors in the kΩ range. As result, the I_{adj}*R2 becomes negligible in the equation and can be ignored.

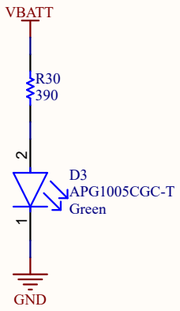
$$V_{out} = 1.25 * \left(1 + \frac{R1}{R2}\right) + I_{adj} * R2 \quad \text{(eq. 1)}$$

Example:
For V_{out} = 2.9 V, can use R_1 = 36 kΩ and R_2 = 27 kΩ.

$$1.25 * \left(1 + \frac{36\ k\Omega}{27\ k\Omega}\right) = 2.91\ V \quad \text{(eq. 2)}$$

51.1k/27.1k ->3.591V





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