

LDOs

CONNECTORS / SWITCHES

DIGITAL IC


ANALOG / MIXED IC

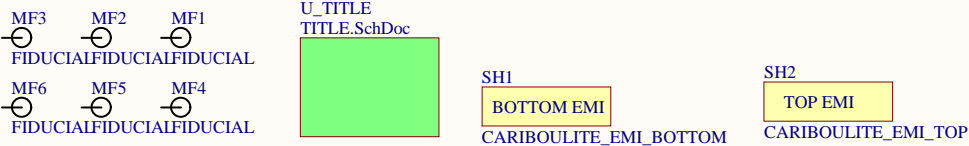
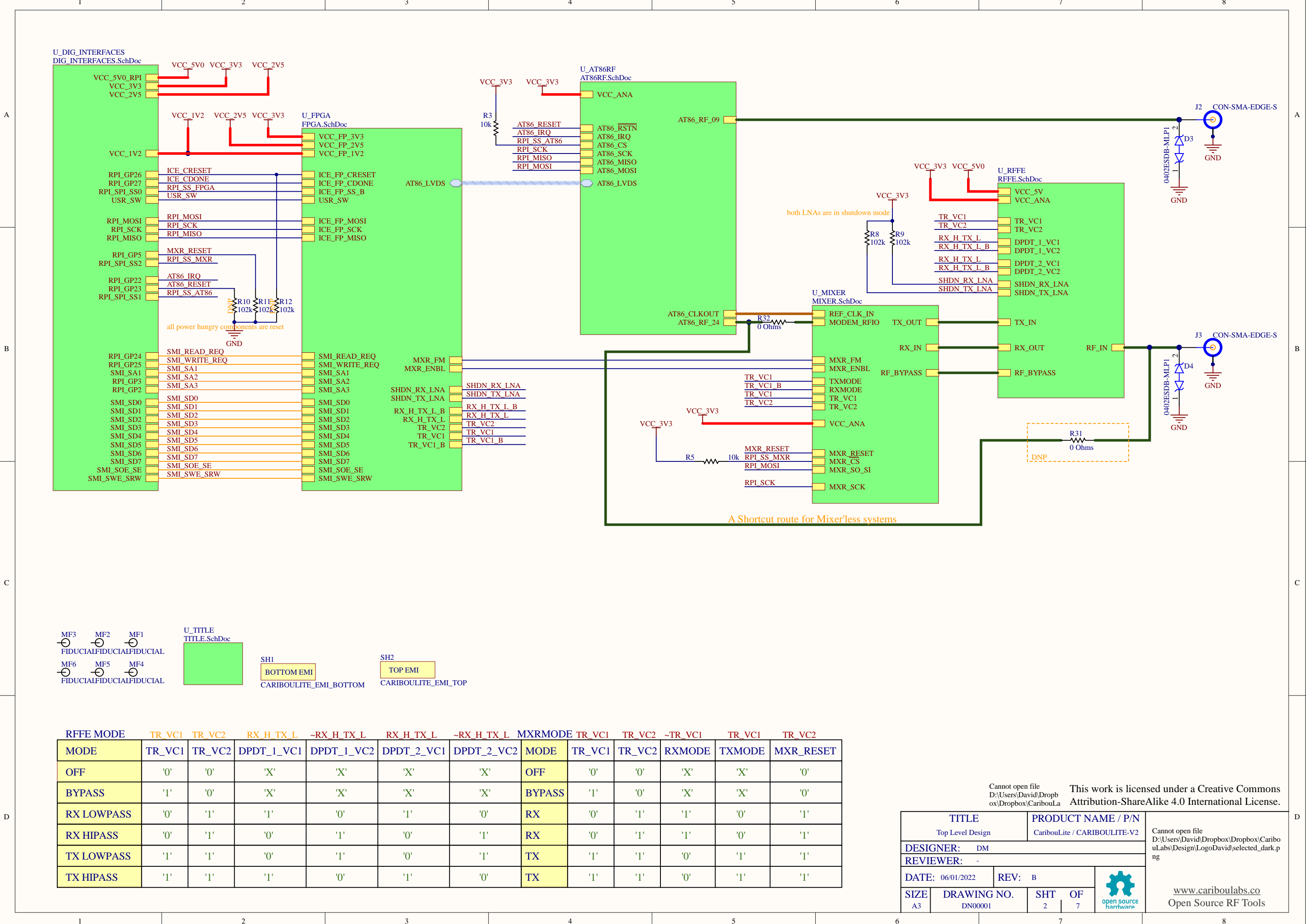
CC

BY

SA

This work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License.

TITLE Block Diagrams		PRODUCT NAME / P/N CaribouLite / CARIBOULITE-V2		<div> <a href="http://www.cariboulabs.co">www.cariboulabs.co</a> Open Source RF Tools</div>
DESIGNER: DM				
REVIEWER: -				
DATE: 05/01/2022		REV: B		
SIZE A3	DRAWING NO. *	SHT 1	OF 7	




RFFE MODE	TR_VC1	TR_VC2	RX_H_TX_L	~RX_H_TX_L	RX_H_TX_L	~RX_H_TX_L	MXRMODE	TR_VC1	TR_VC2	~TR_VC1	TR_VC1	TR_VC2
MODE	TR_VC1	TR_VC2	DPDT_1_VC1	DPDT_1_VC2	DPDT_2_VC1	DPDT_2_VC2	MODE	TR_VC1	TR_VC2	RXMODE	TXMODE	MXR_RESET
OFF	'0'	'0'	'X'	'X'	'X'	'X'	OFF	'0'	'0'	'X'	'X'	'0'
BYPASS	'1'	'0'	'X'	'X'	'X'	'X'	BYPASS	'1'	'0'	'X'	'X'	'0'
RX LOWPASS	'0'	'1'	'1'	'0'	'1'	'0'	RX	'0'	'1'	'1'	'0'	'1'
RX HIPASS	'0'	'1'	'0'	'1'	'0'	'1'	RX	'0'	'1'	'1'	'0'	'1'
TX LOWPASS	'1'	'1'	'0'	'1'	'0'	'1'	TX	'1'	'1'	'0'	'1'	'1'
TX HIPASS	'1'	'1'	'1'	'0'	'1'	'0'	TX	'1'	'1'	'0'	'1'	'1'

Cannot open file  
D:\Users\David\Dropbox\CaribouLabs\Design\LogoDavid\selected\_dark.png

This work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License.

TITLE Top Level Design		PRODUCT NAME / P/N CaribouLite / CARIBOULITE-V2	
DESIGNER: DM			
REVIEWER: -			
DATE: 06/01/2022		REV: B	
SIZE A3	DRAWING NO. DN00001	SHT 2	OF 7

  
www.cariboulabs.co  
Open Source RF Tools

## A



## B



## C

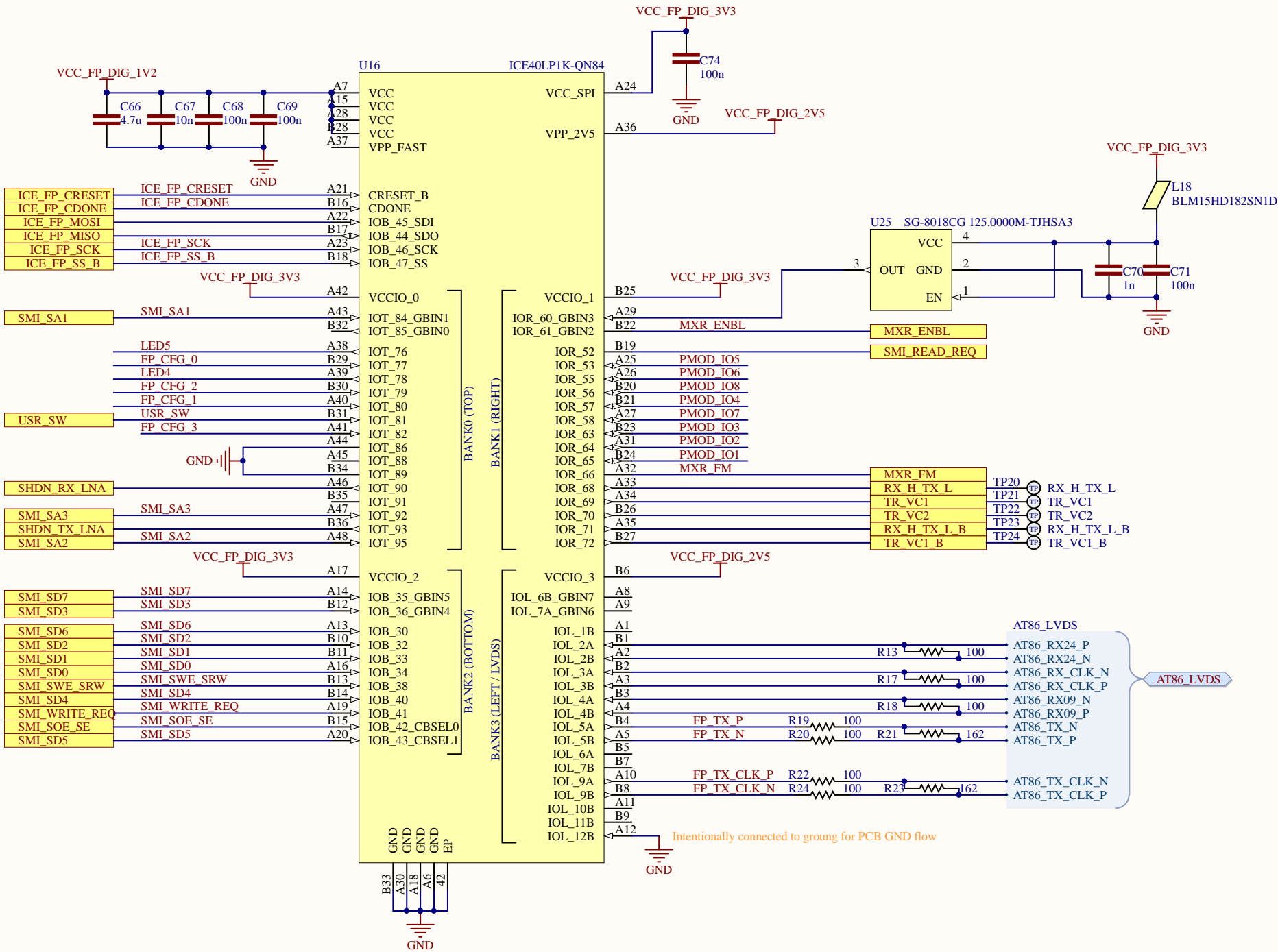


## C



[www.cariboulabs.co](http://www.cariboulabs.co)  
Open Source RF Tools

FPGA



LVDS Negated Pairs

AT86\_TX  
AT86\_RX09  
AT86\_TX\_CLK

The other two are direct logic.

PROGRAMMING

POR=> Check SS  
1. if SS='1' => if NVCM programmed, use NVCM, otherwise use external flash (SPI MASTER).  
2. if SS='0', wait to be configured from external controller through SPI

RESET - restarts the configuration  
CDONE - before configuration finished is '0', When done turns '1'

Calculation of differential lines

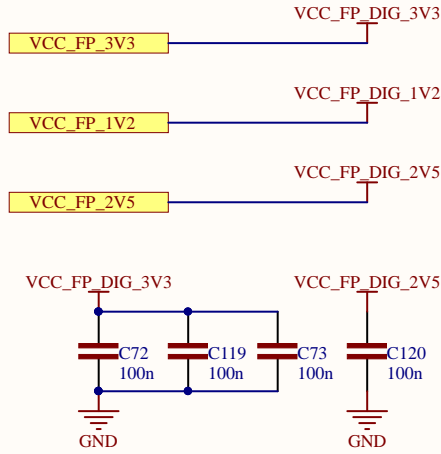
VCCIO = 2.5V  
VOD = 0.5V (this is the differential swing nominal)  
Rouput = 30 Ohms (given by ICE40 Specs)

The parallel output resistor:  
 $VCCIO = 2.5V \Rightarrow R_p = 2 * (50 * 2.5 / (2.5 - (2 * 0.5))) = 250 / 1.5 = 166 \text{ Ohms} \Rightarrow R_p / 2 = 83.3 \text{ Ohms}$   
The series output resistors:  
 $VCCIO = 2.5V \Rightarrow R_s = (50 * 83.3) / (83.3 - 50) - 30 = 4165 / 33.3 - 30 = 95 \text{ Ohms}$

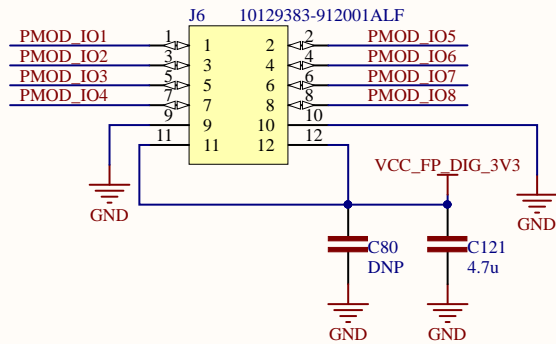
But, we want to make Rs a 100 Ohms to minimize BOM =>  
 $R_s = 100 \Rightarrow R_p = 162.5 \text{ Ohms} \Rightarrow V_{od} = 0.48 \text{ Vdiff} \Rightarrow \text{Looks good enough!}$

Connect the positive or true polarity side of the differential pair to the DPxxA input and the negative or complementary side of the pair to the DPxxB input.  
==== If it is easier to route the differential pair, the input pins can be swapped, which produces an inverted input value. ====  
====The inverted input value can subsequently be inverted by logic within the FPGA. ====

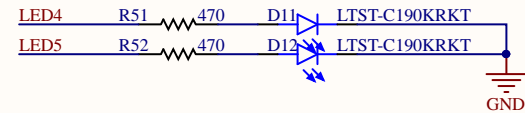
POWER TERMINALS



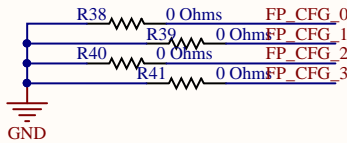
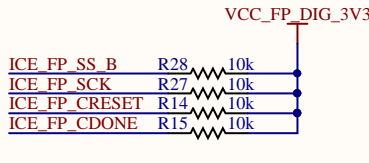
PMOD





LEDS



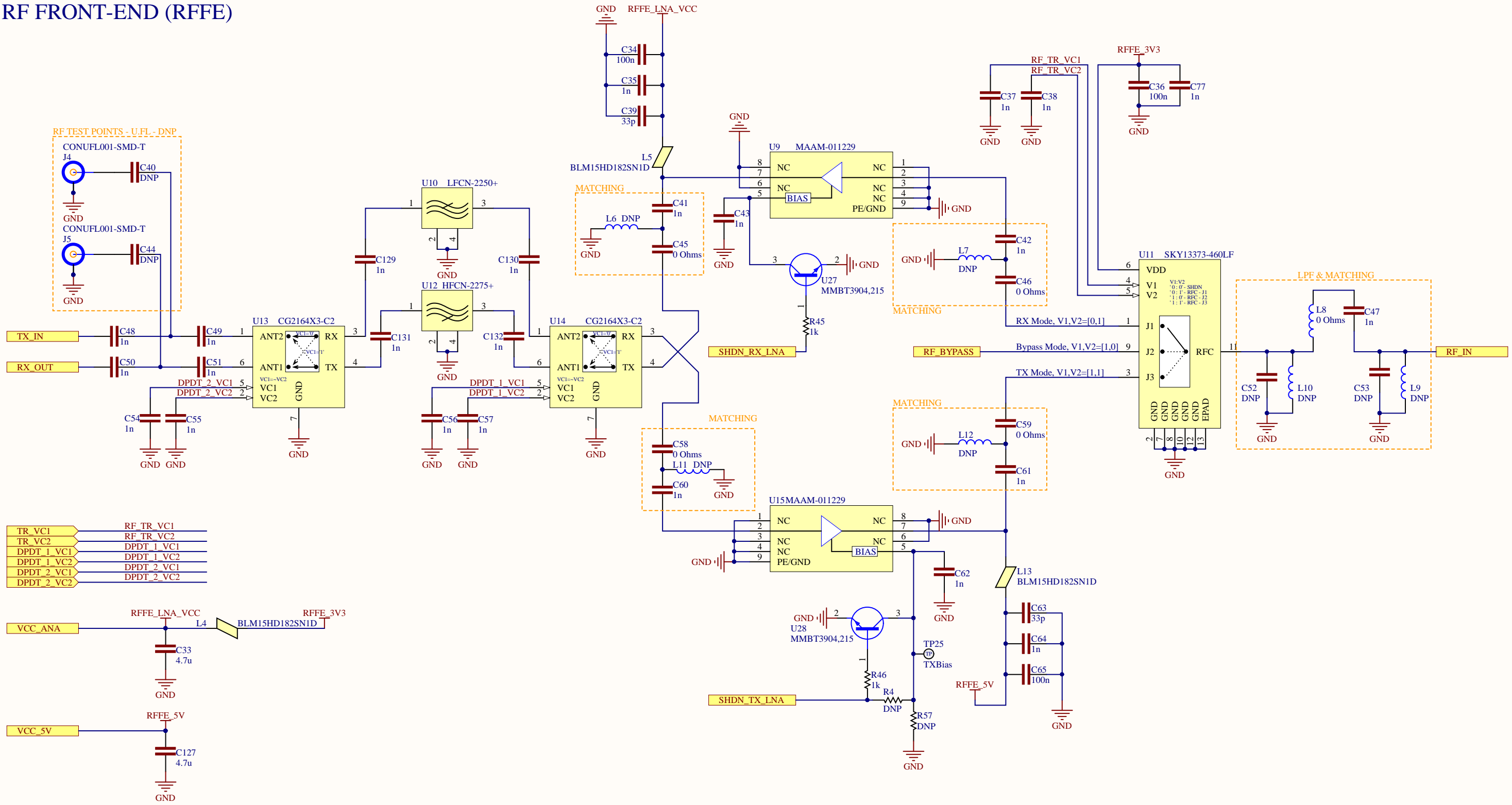
Configuration Resistors - Place 0 Ohm for pulldowns as needed  
Apply internal FPGA pullups on all config pins



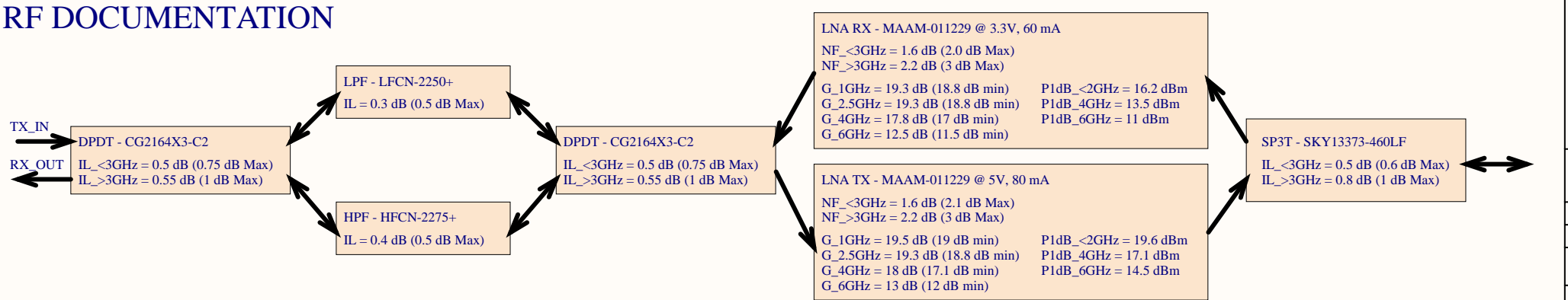
This work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License.

TITLE FPGA ICE40LP		PRODUCT NAME / P/N CaribouLite / CARIBOULITE-V2	
DESIGNER:    DM			
REVIEWER:    -			
DATE: 05/01/2022		REV:    B	
SIZE A3	DRAWING NO. *	SHT 4	OF 7
			
			
		<a href="http://www.cariboulabs.co">www.cariboulabs.co</a> Open Source RF Tools	

RF FRONT-END (RFFE)



RF DOCUMENTATION



This work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License.

TITLE		PRODUCT NAME / P/N	
RF Front-End		CaribouLite / CARIBOULITE-V2	
DESIGNER:		DM	
REVIEWER:		-	
DATE: 05/01/2022		REV: B	
SIZE A3	DRAWING NO. *	SHT 5	OF 7



**Labs**  
**Caribou**  
www.cariboulabs.co  
Open Source RF Tools

## A



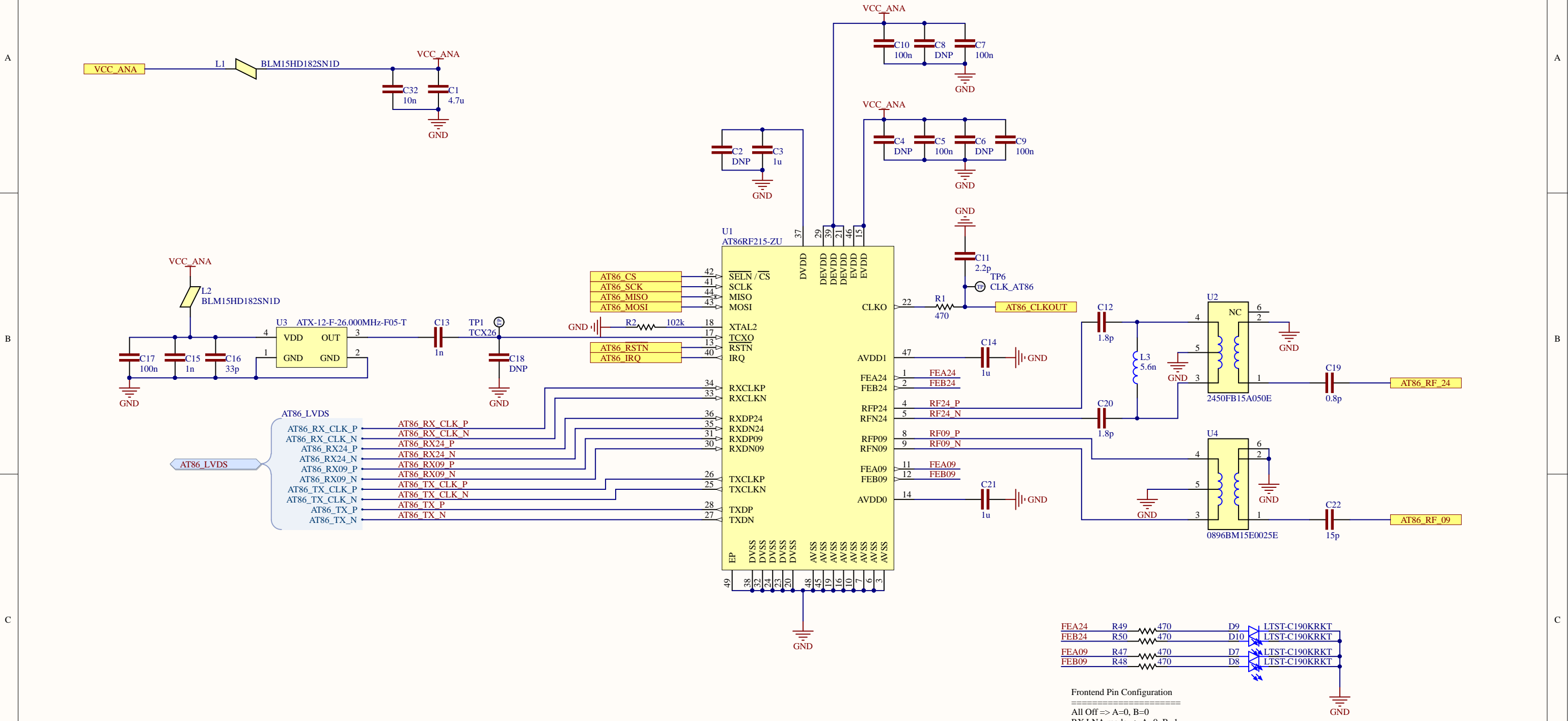
## A



1	2	3	4	5	6	7	8
---	---	---	---	---	---	---	---



MODEM - AT86RF215



RF DOCUMENTATION

