


LDOs


CONNECTORS / SWITCHES

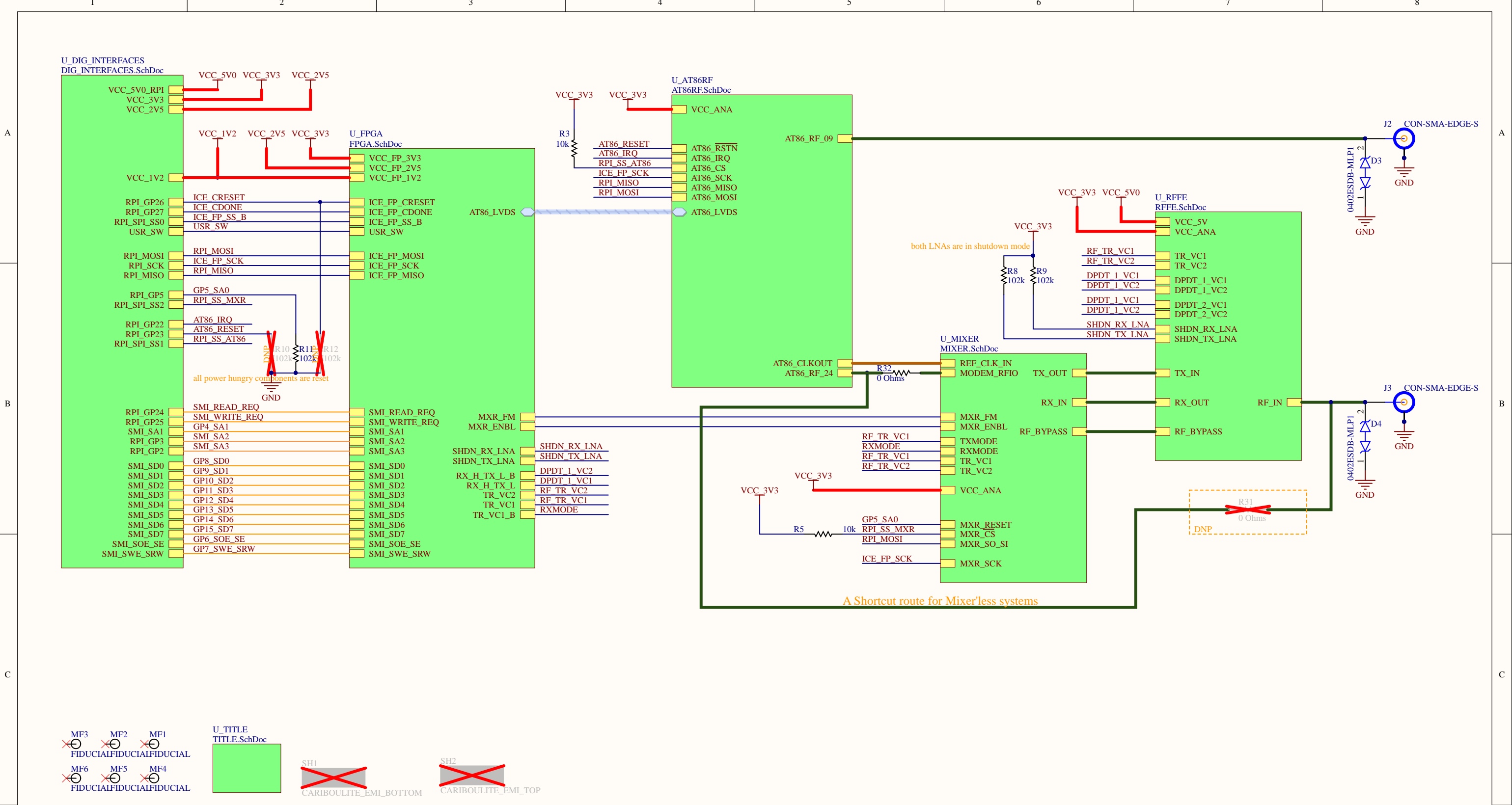
DIGITAL IC

ANALOG / MIXED IC

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TITLE Block Diagrams		PRODUCT NAME / P/N CaribouLite / CARIBOULITE-V2		<div> www.cariboulabs.co Open Source RF Tools</div>
DESIGNER: DM				
REVIEWER: -				
DATE: 10/02/2022		REV: B		
SIZE A3	DRAWING NO. *	SHT 1	OF 7	


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hardware



MF3

MF2

MF1

MF6

MF5

MF4

U_TITLE

TITLE.SchDoc

SH1

CARIBOULITE_EMI_BOTTOM

SH2

CARIBOULITE_EMI_TOP

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'

CC

BY

SA

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TITLE

Top Level Design

PRODUCT NAME / P/N

CaribouLite / CARIBOULITE-V2

DESIGNER: DM

REVIEWER: -

DATE: 10/02/2022

REV: B

SIZE A3

DRAWING NO. *

SHT 2

OF 7

open source hardware

Labs

Caribou

www.cariboulabs.co

Open Source RF Tools

A



B



C

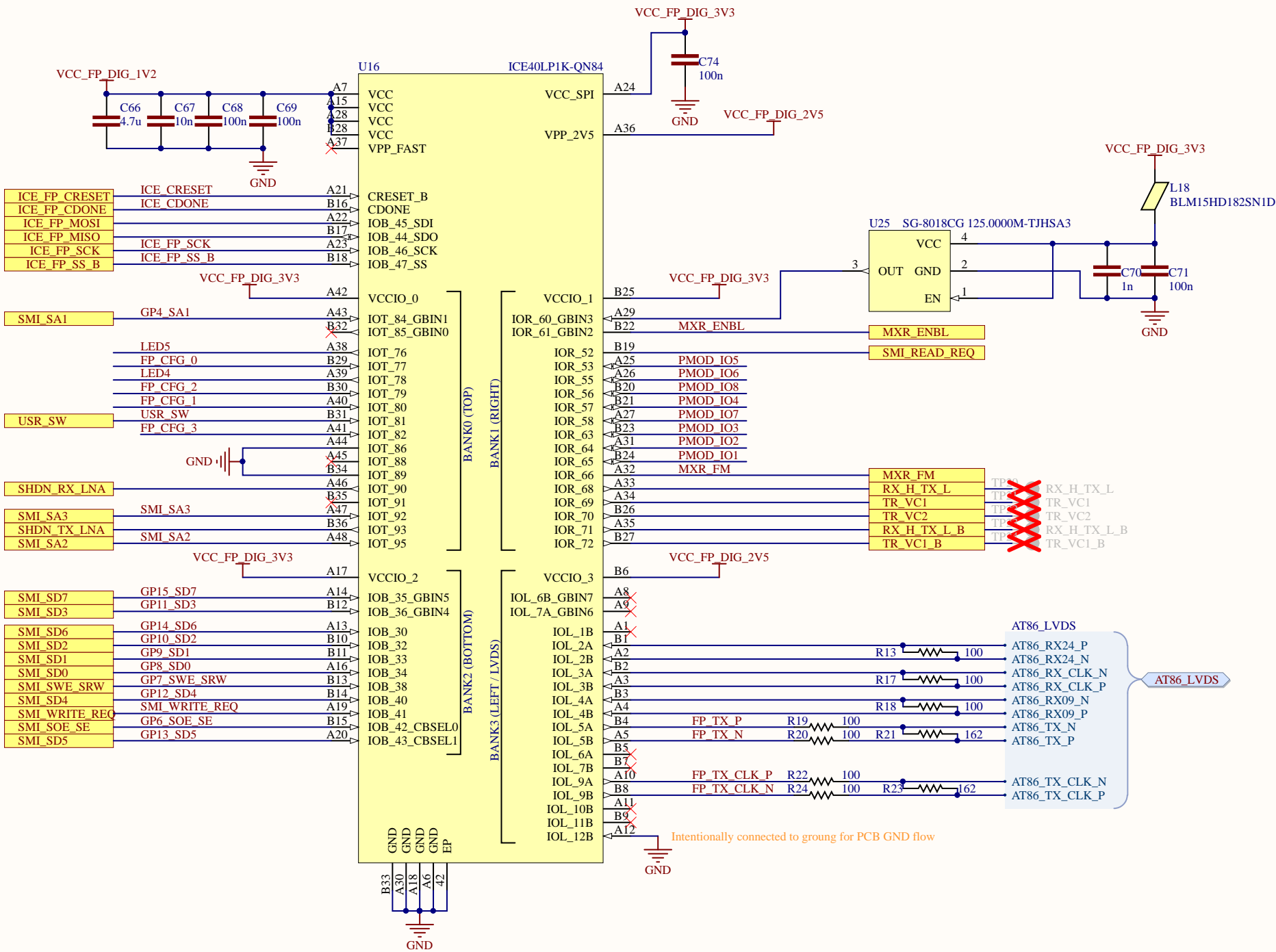


C



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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

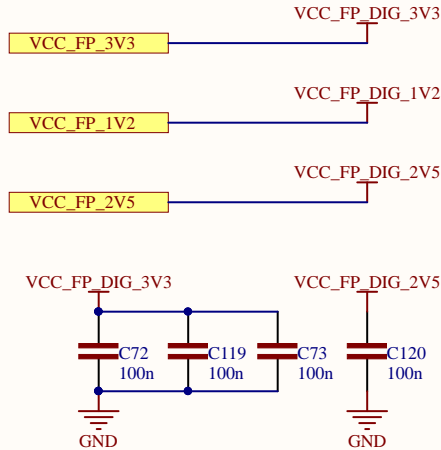
VCCIO = 2.5V
VOD = 0.5V (this is the differential swing nominal)
Rouput = 30 Ohms (given by ICE40 Specs)

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:
 $VCCIO = 2.5V \Rightarrow R_s = (50 * 83.3) / (83.3 - 50) - 30 = 4165 / 33.3 - 30 = 95 \text{ Ohms}$

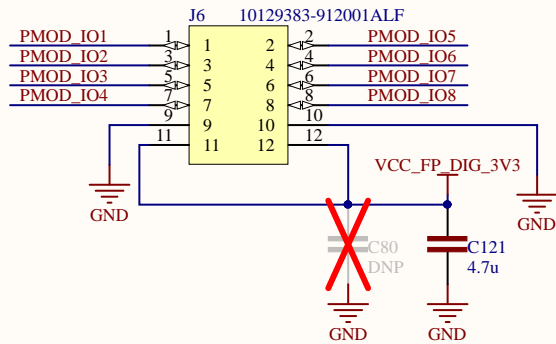
But, we want to make Rs a 100 Ohms to minimize BOM =>
 $R_s = 100 \Rightarrow R_p = 162.5 \text{ Ohms} \Rightarrow V_{od} = 0.48 \text{ Vdiff} \Rightarrow \text{Looks good enough!}$

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. ====

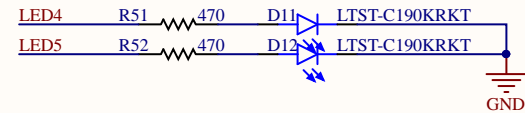
POWER TERMINALS



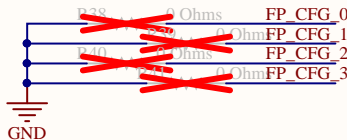
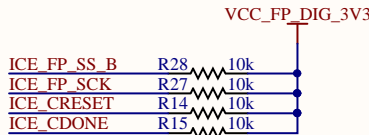
PMOD





LEDS



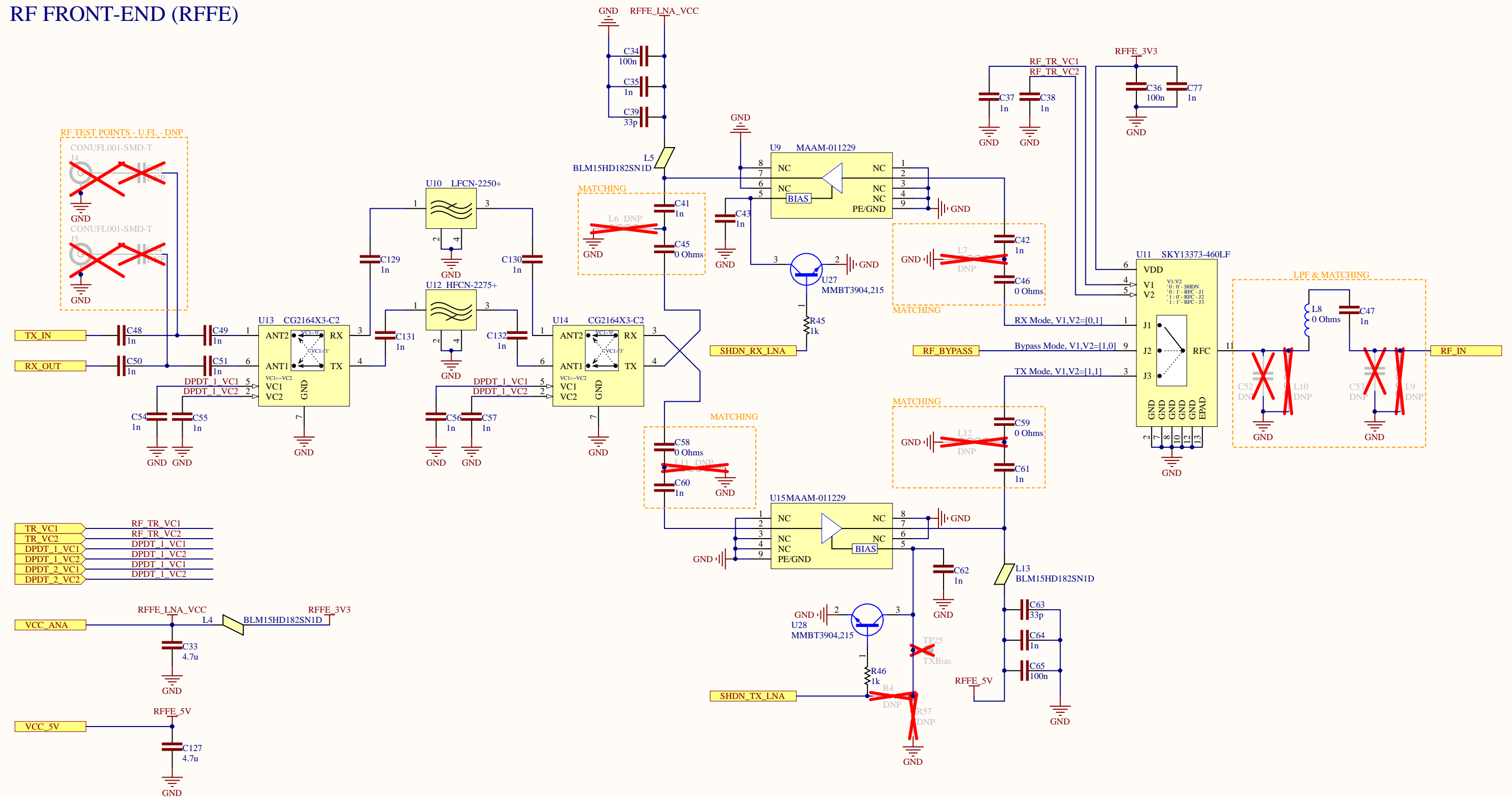
Configuration Resistors - Place 0 Ohm for pulldowns as needed
Apply internal FPGA pullups on all config pins



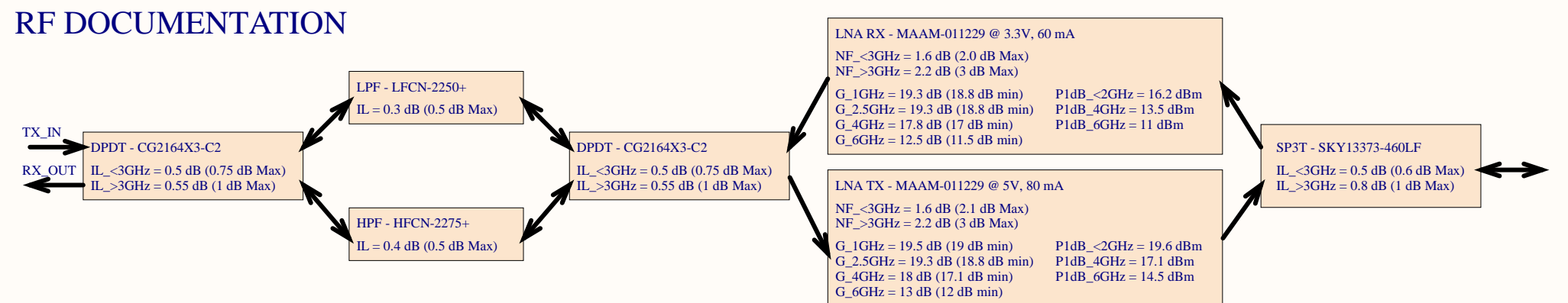
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TITLE FPGA ICE40LP		PRODUCT NAME / P/N CaribouLite / CARIBOULITE-V2		<div> www.cariboulabs.co Open Source RF Tools</div>
DESIGNER: DM				
REVIEWER: -				
DATE: 10/02/2022		REV: B		
SIZE A3	DRAWING NO. *	SHT 4	OF 7	
<div> open source hardware</div>				


RF FRONT-END (RFFE)



RF DOCUMENTATION

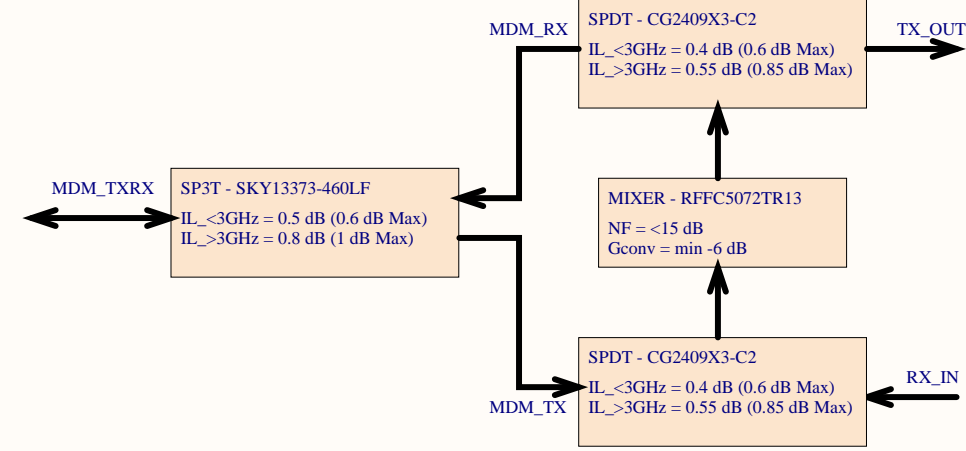
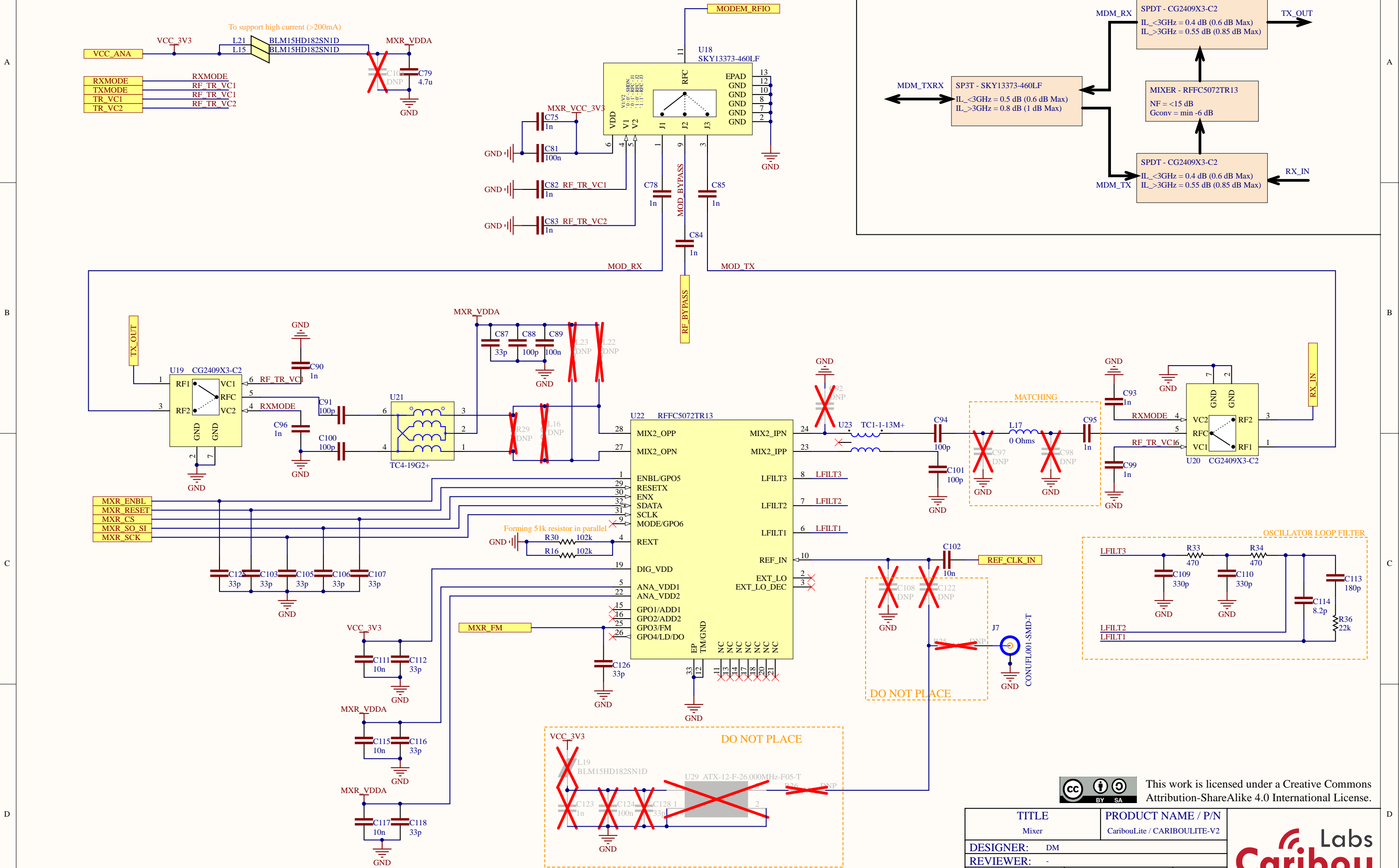


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DESIGNER: DM				
REVIEWER: -				
DATE: 08/05/2022		REV: B		
SIZE A3	DRAWING NO. *	SHT 5	OF 7	

MIXER - QORVO RFFC5072

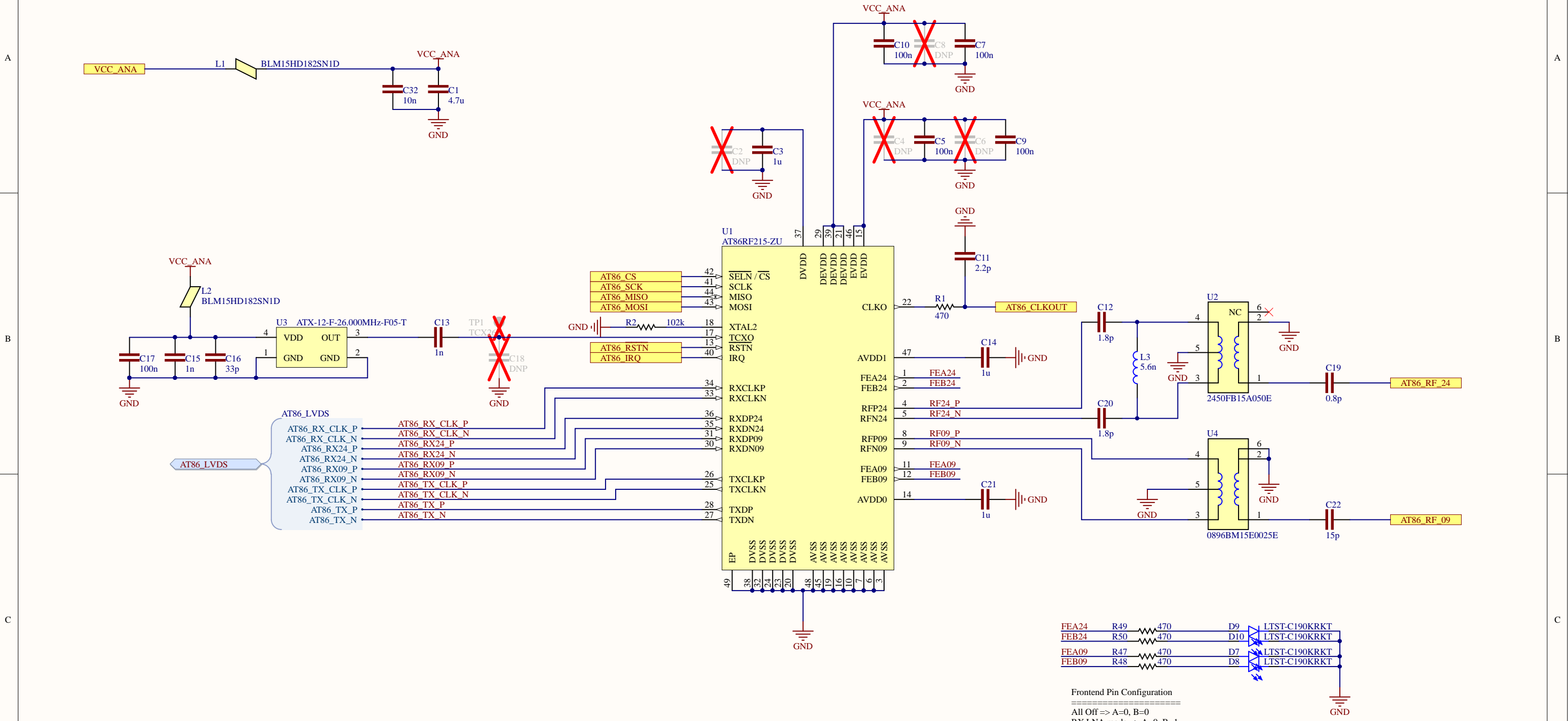
RF DOCUMENTATION



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TITLE Mixer		PRODUCT NAME / P/N CaribouLite / CARIBOULITE-V2		<div><p>www.cariboulabs.co Open Source RF Tools</p></div>
DESIGNER: DM				
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MODEM - AT86RF215



RF DOCUMENTATION

