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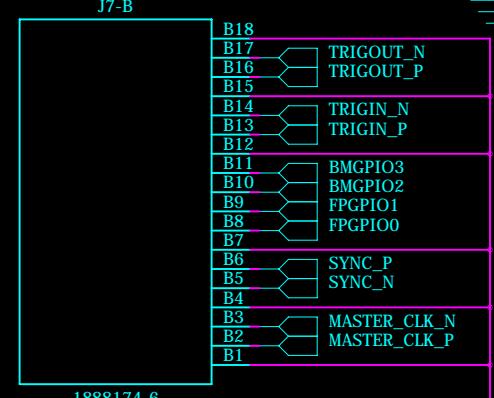
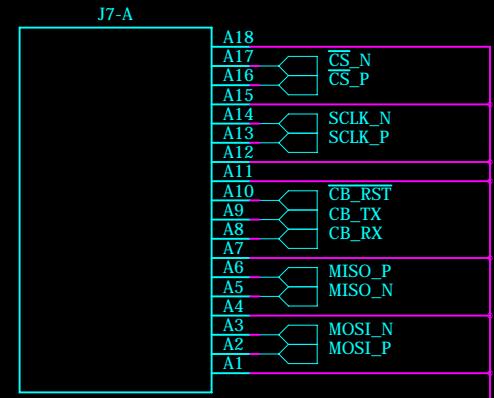
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## REVISION RECORD

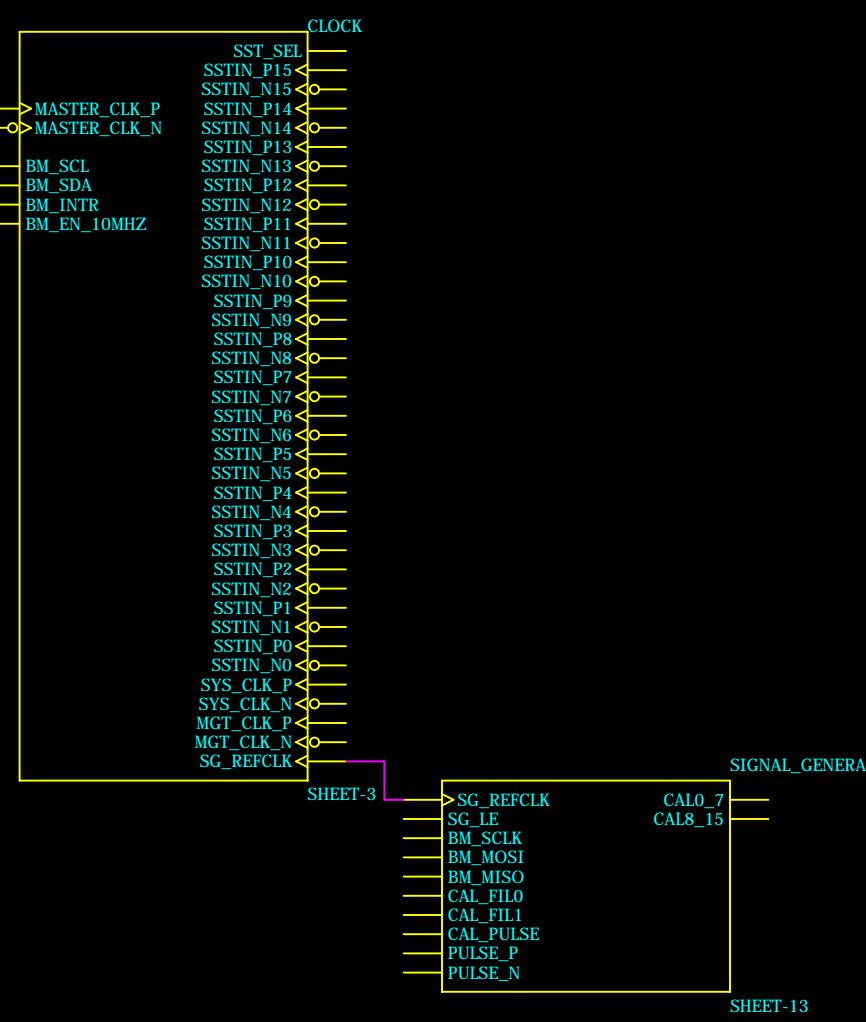
LTR	ECO NO:	APPROVED:	DATE:

D



protection diodes somewhere??

ECO 6/2: swap A/B on sideband signals



SFF-8087 connector

Cable is designed with 8 differential pairs

TRIGIN+/-

TRIGOUT+/-

CLK+/-

SYNC+/-

MOSI/GND

MISO/GND (these are implemented as differential pairs)

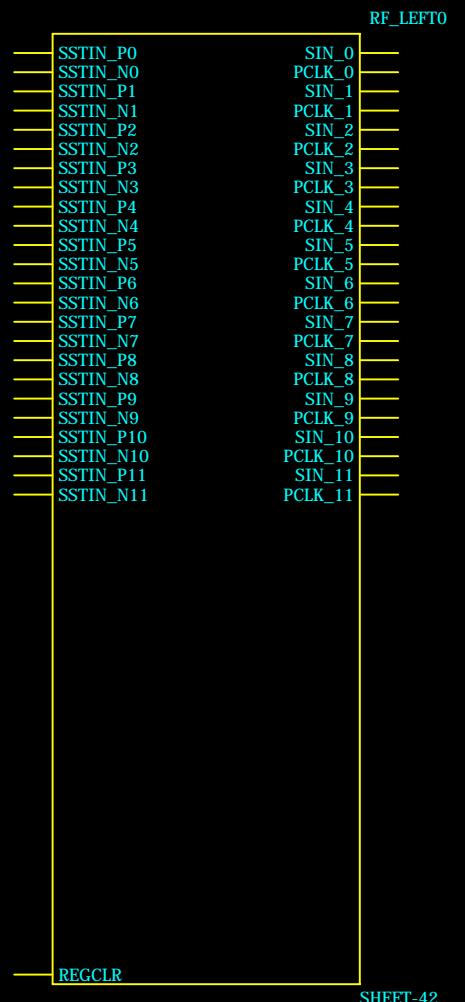
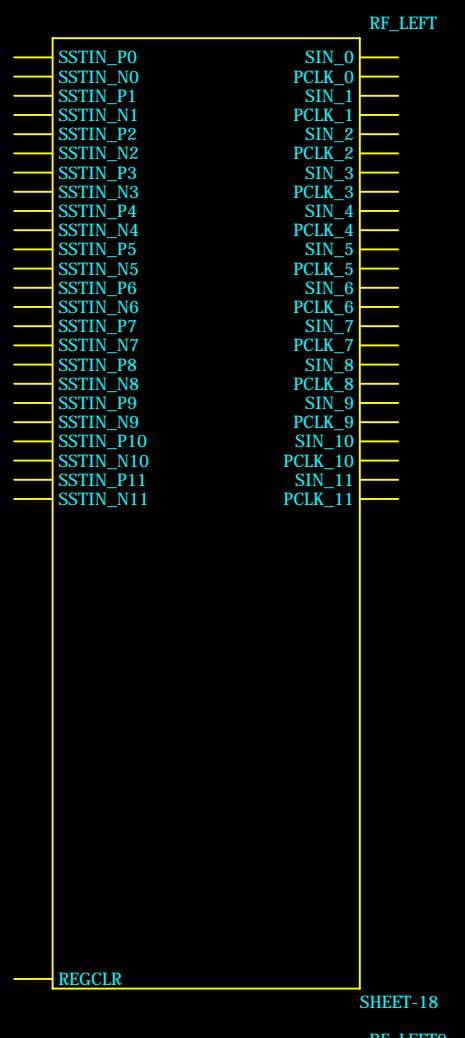
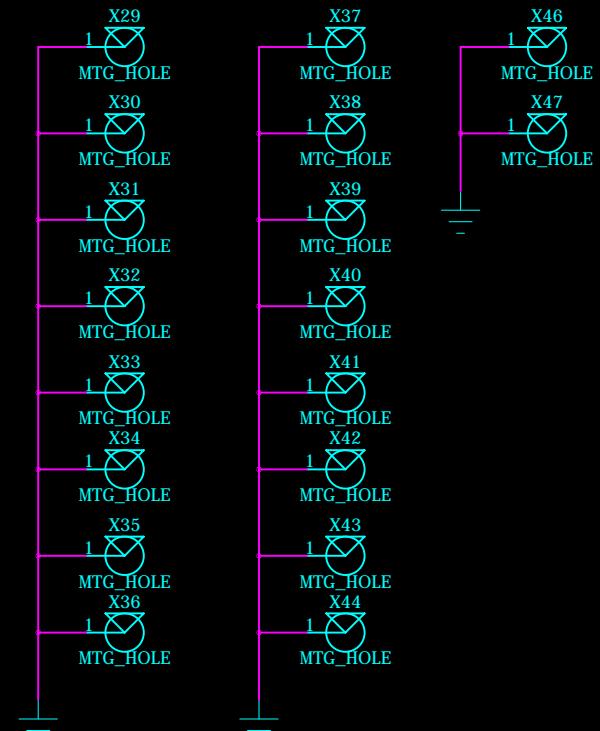
SCLK/GND (allows for a higher-speed FPCA-to-PPGA link)

CS/GND (if used single ended, just drive N side to ground in FPGA)

There are also 8 sideband signals

RX/TX/RST/GND/GPIO[3:0]

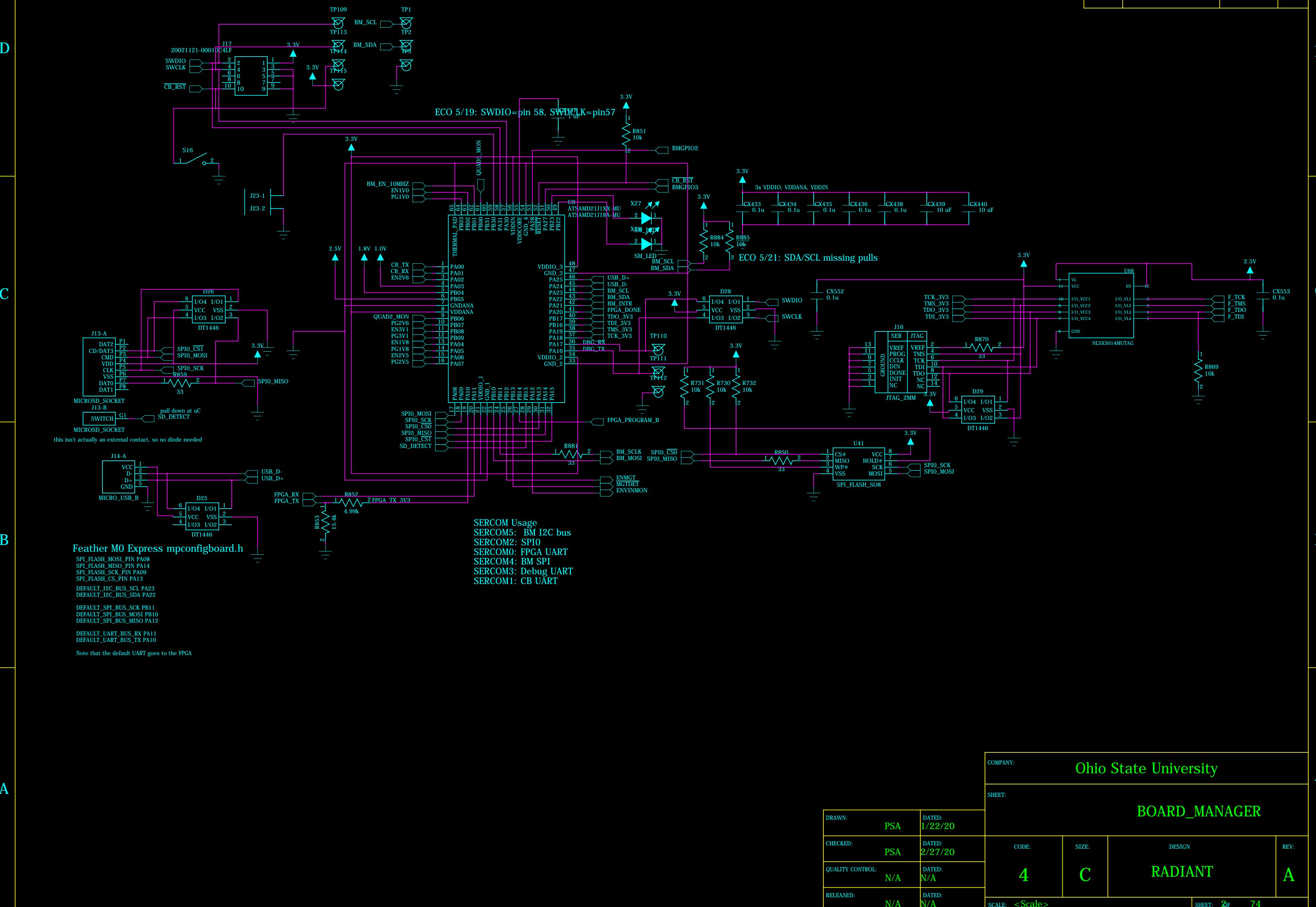
At some point I'll finish a top block diagram...



COMPANY:	Ohio State University		
SHEET:	TOP		
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CHECKED:	PSA	DATED:	2/27/20
QUALITY CONTROL:	N/A	DATED:	N/A
RELEASED:	N/A	DATED:	N/A
CODE:	4	SIZE:	C
DESIGN:	RADIANT		A
REV:	<Scale>		b74

6	5	4	3	2	1
D	D	C	C	B	A

REVISION RECORD			
LTR	ECO NO:	APPROVED:	DATE:



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## REVISION RECORD

LTR	ECO NO.	APPROVED:	DATE:

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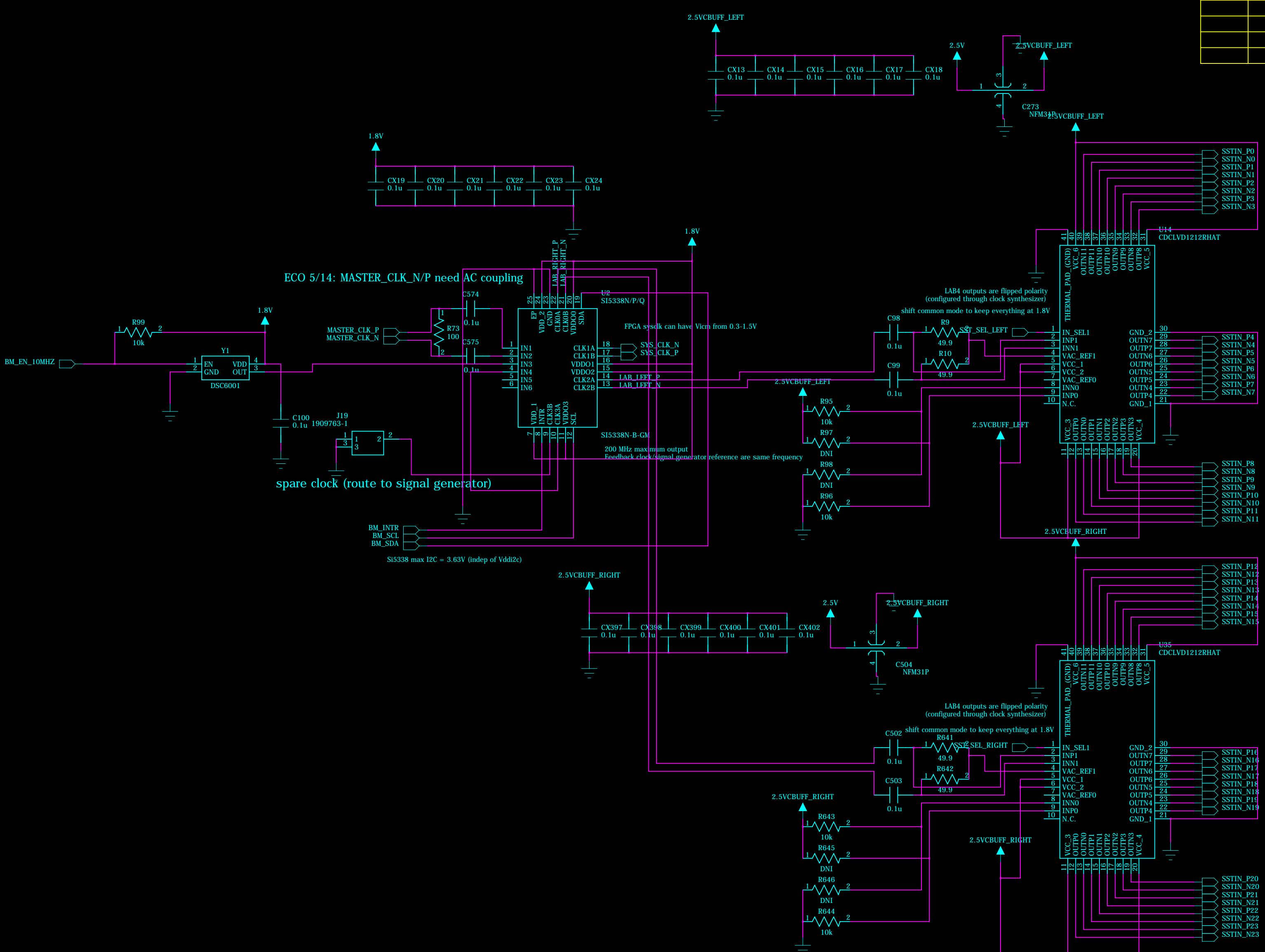
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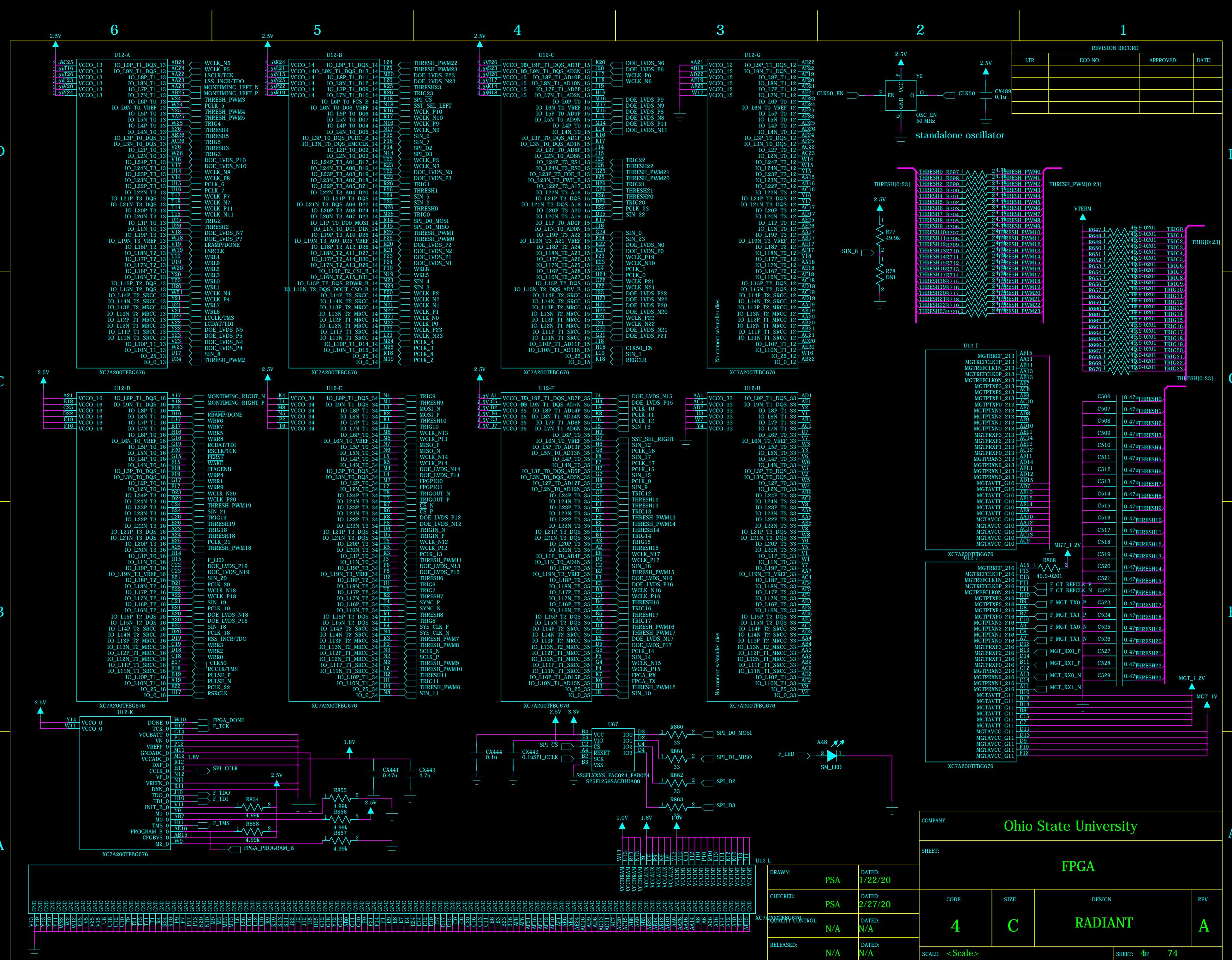
B

A

A



COMPANY:	Ohio State University		
SHEET:	CLOCK		
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CHECKED:	PSA	DATED:	2/27/20
QUALITY CONTROL:	N/A	DATED:	N/A
RELEASED:	N/A	DATED:	N/A
CODE:	C	SIZE:	RADIANT
REV:	A	SCALE: <Scale>	74
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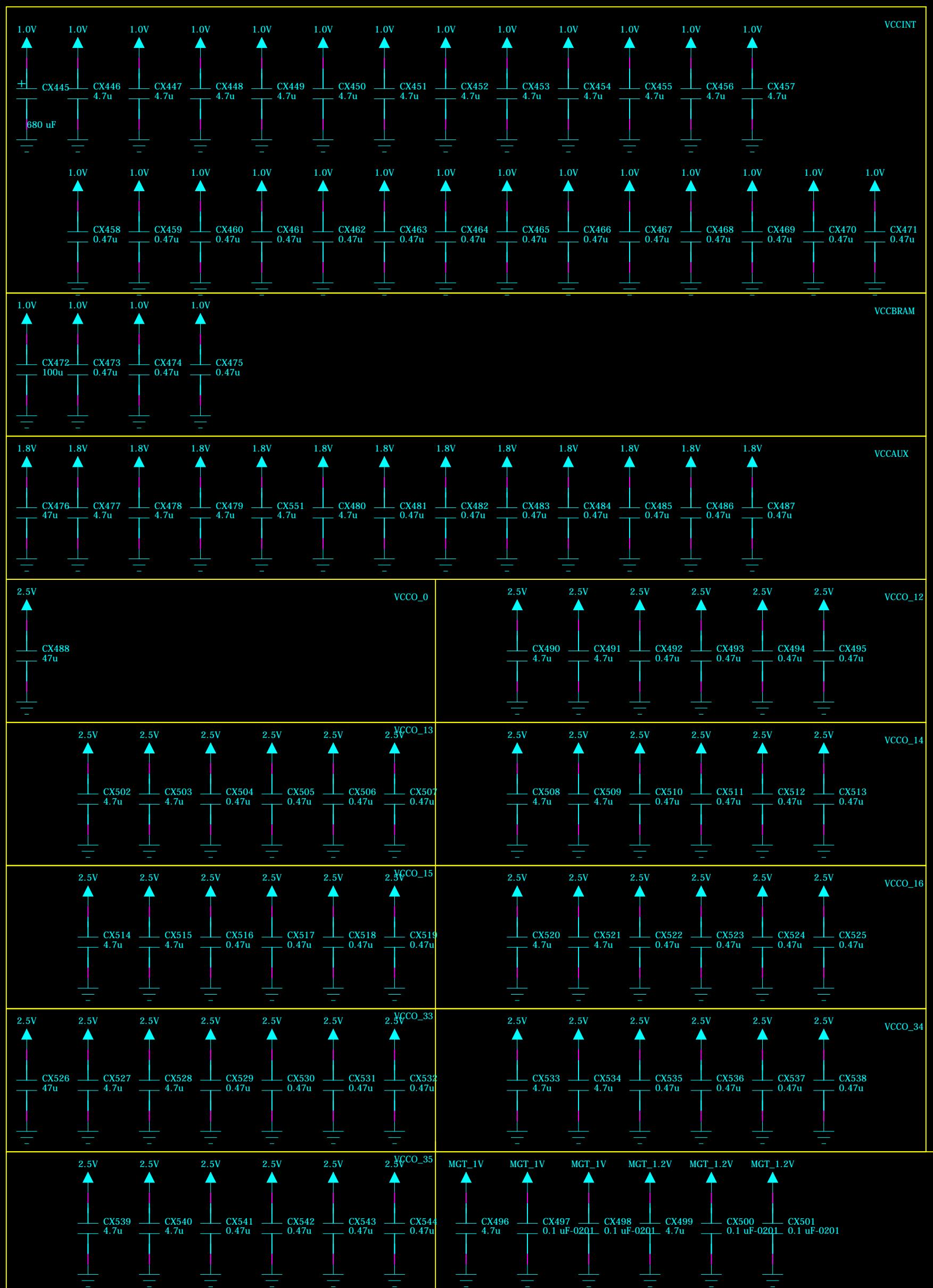
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## REVISION RECORD

LTR	ECO NO:	APPROVED:	DATE:

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A

COMPANY:	Ohio State University		
SHEET:	FPGA_DECUPLE		
DRAWN:	PSA	DATED:	1/22/20
CHECKED:	PSA	DATED:	2/27/20
QUALITY CONTROL:	N/A	DATED:	N/A
RELEASED:	N/A	DATED:	N/A
SCALE:	<Scale>		Sheet: 50f 74

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## REVISION RECORD

LTR	ECO NO:	APPROVED:	DATE:

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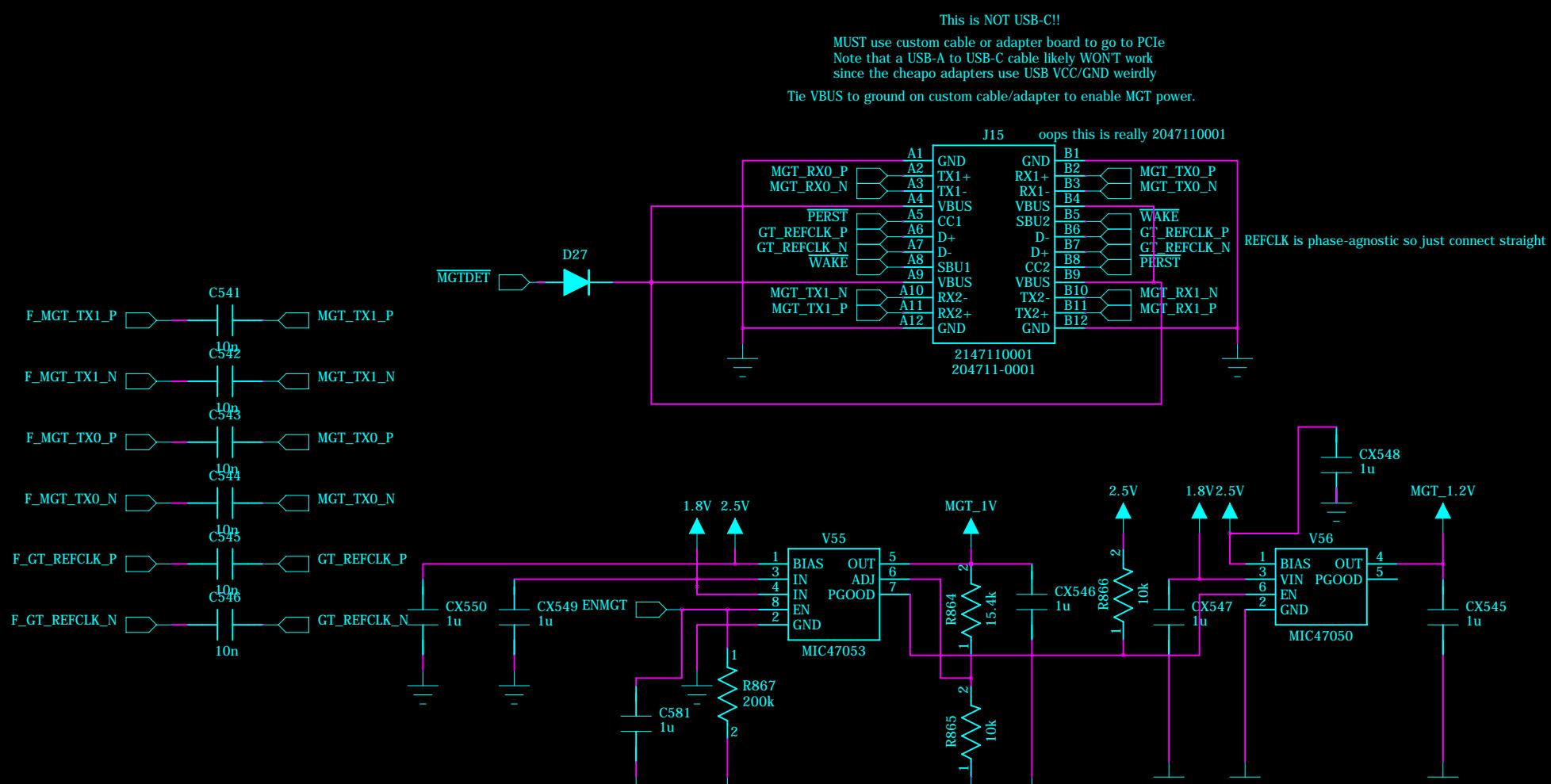
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A



COMPANY:	Ohio State University		
SHEET:	FPGA-PCIE		
DRAWN:	PSA	DATED:	1/22/20
CHECKED:	PSA	DATED:	2/27/20
QUALITY CONTROL:	N/A	DATED:	N/A
RELEASED:	N/A	DATED:	N/A
SCALE:	<Scale>		Sheet: 6 of 74

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## REVISION RECORD

LTR	ECO NO:	APPROVED:	DATE:

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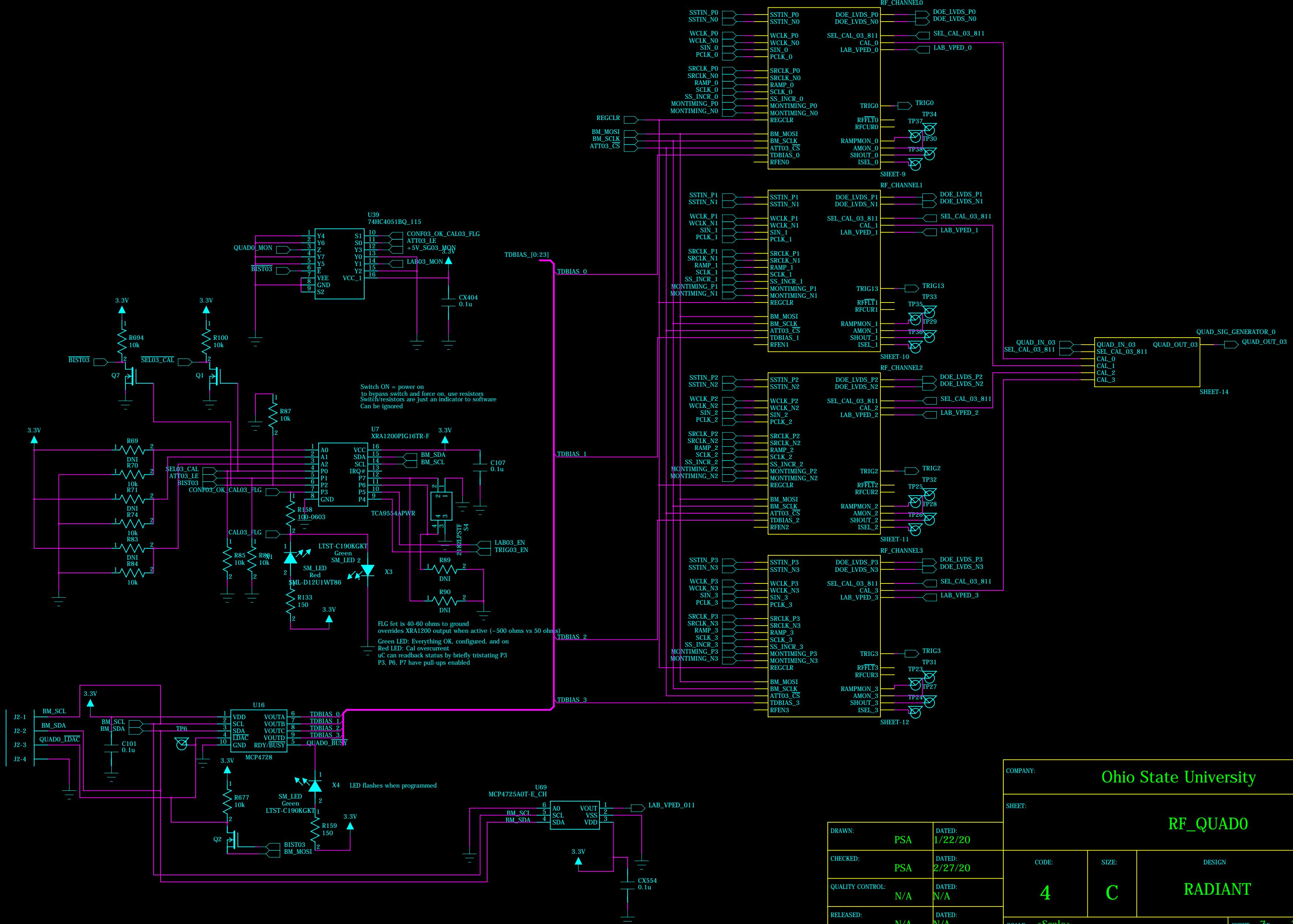
C

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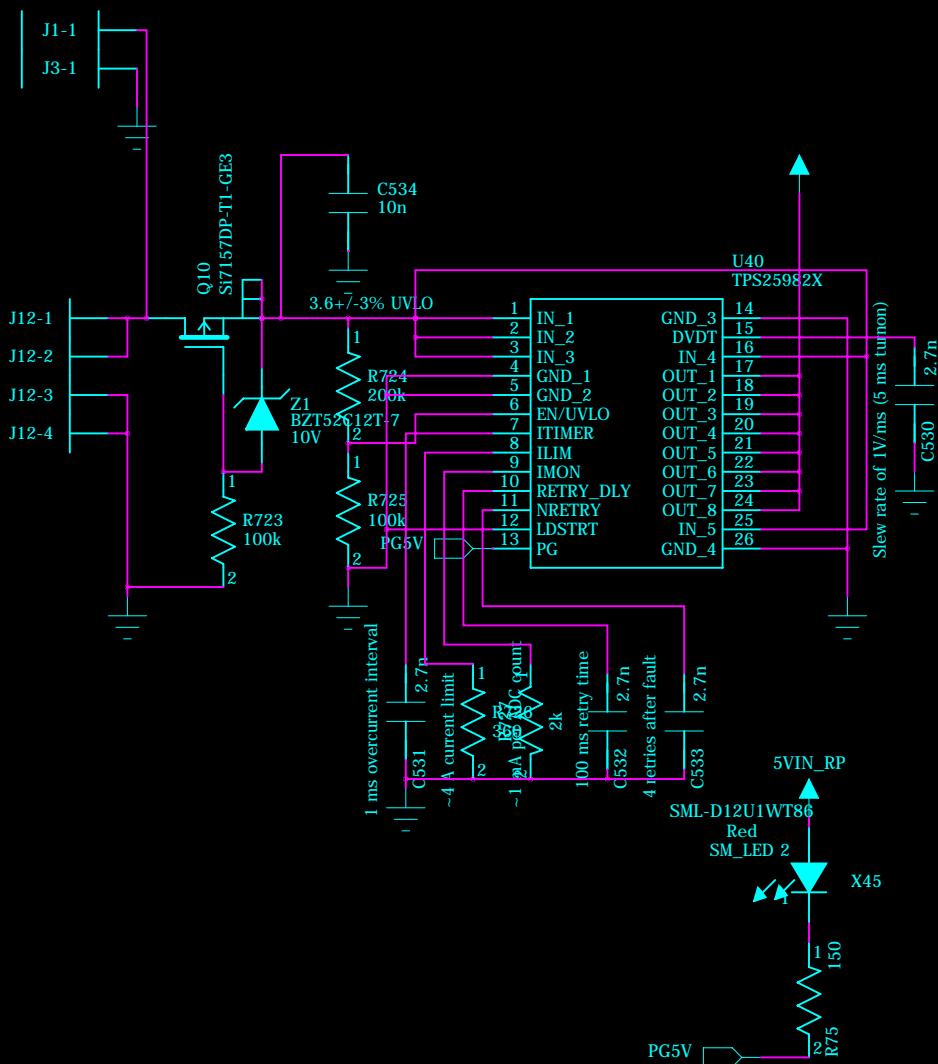
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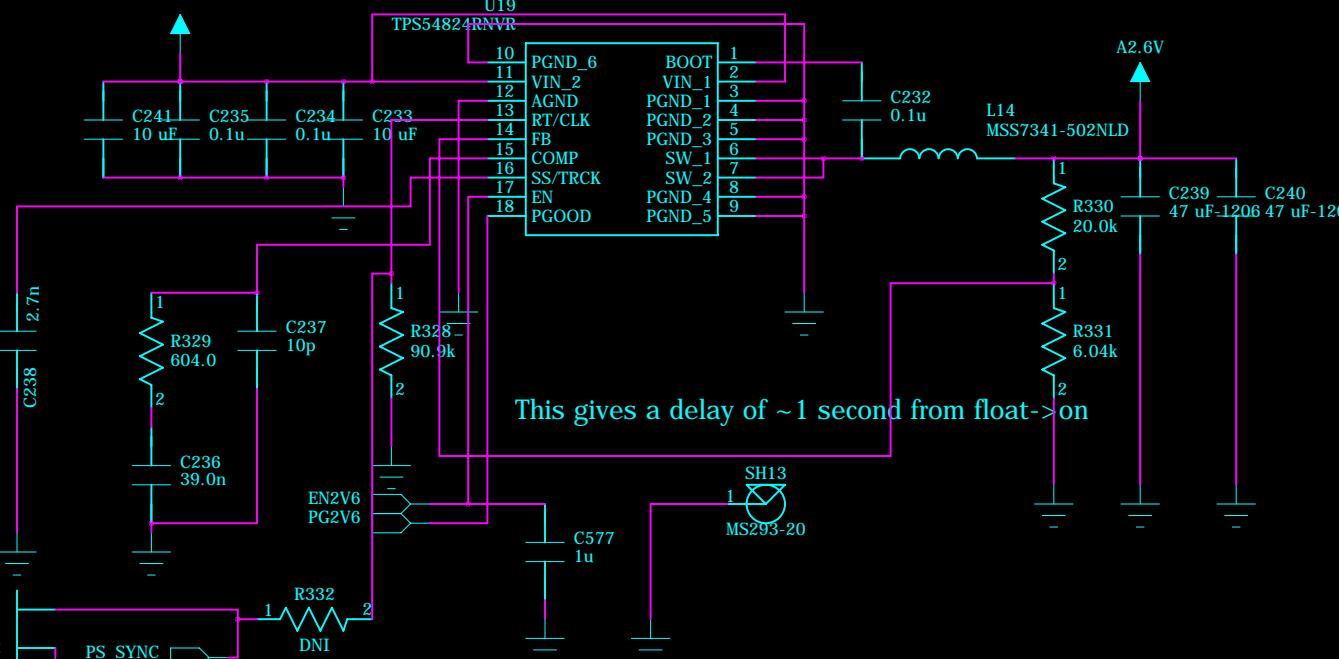
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D

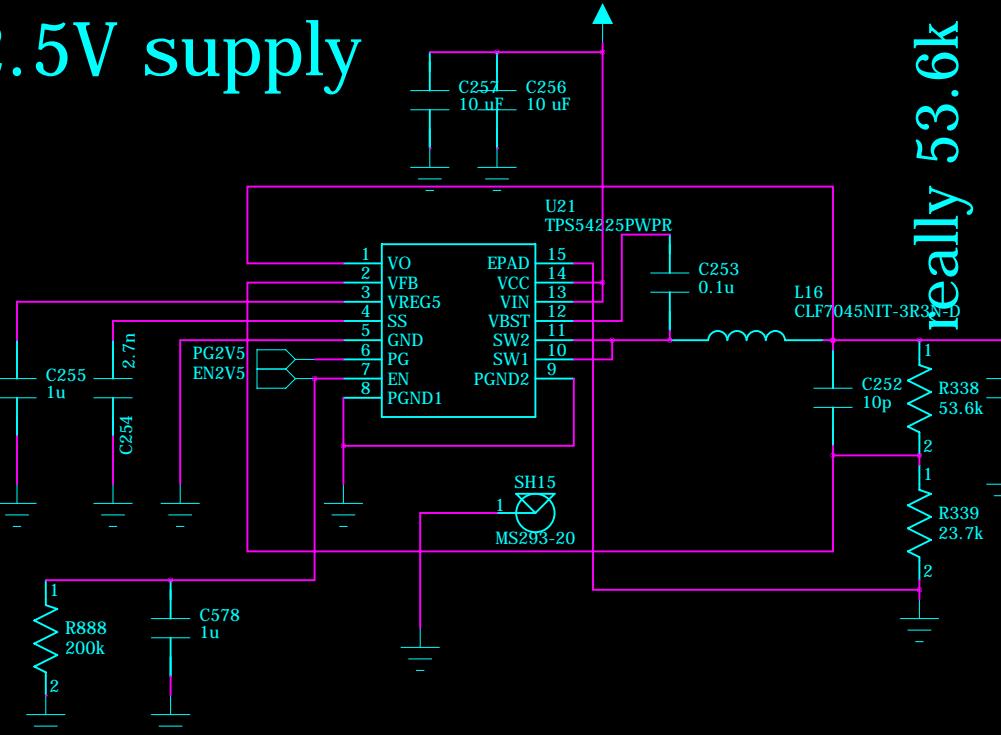
## Input power protection



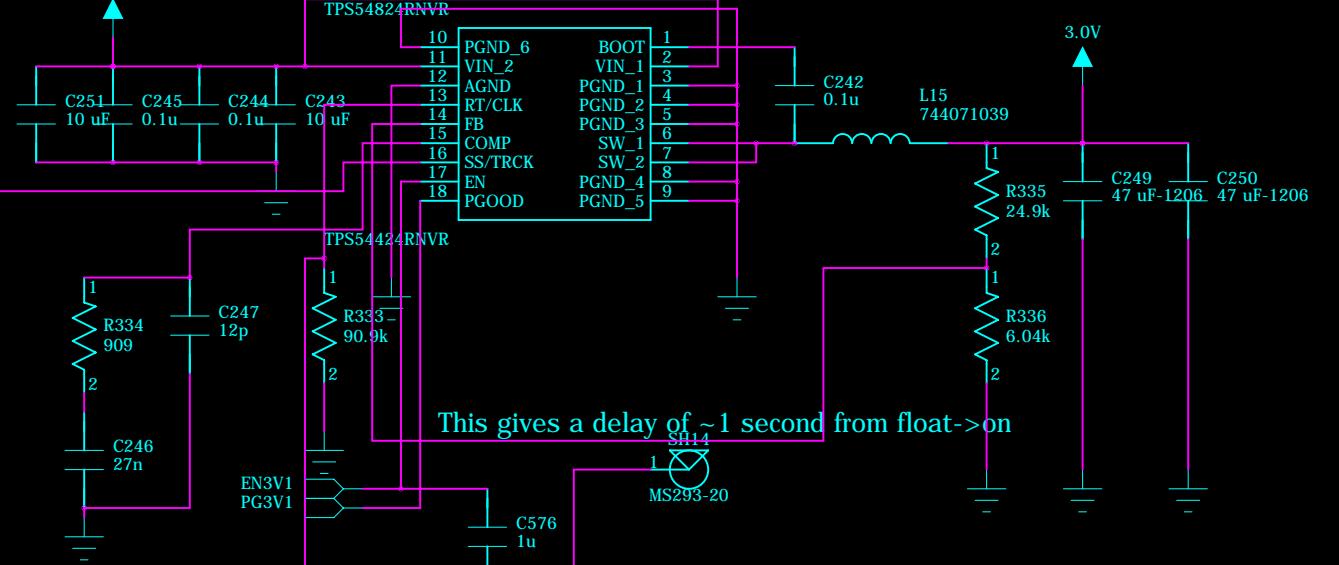
## LAB4D supply (2.6V, regulated to 2.5V)



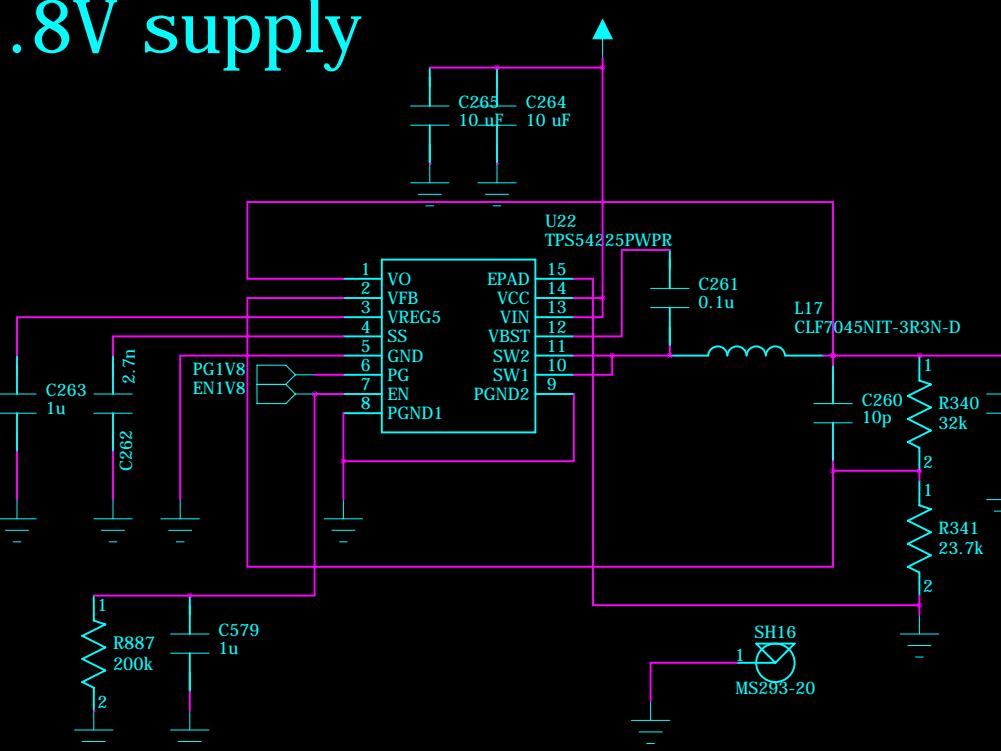
## 2.5V supply



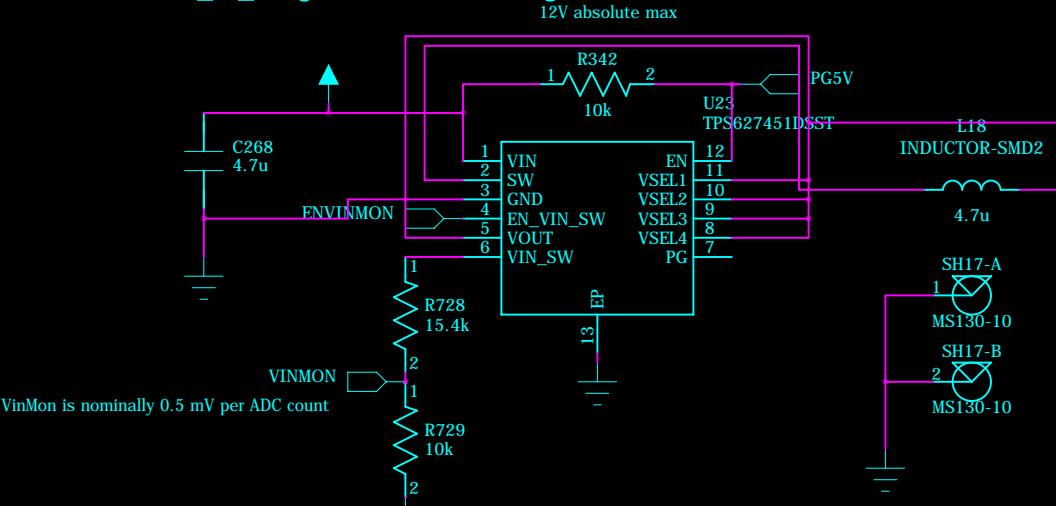
## Trigger supply (3.07V, regulated to 3.0V)



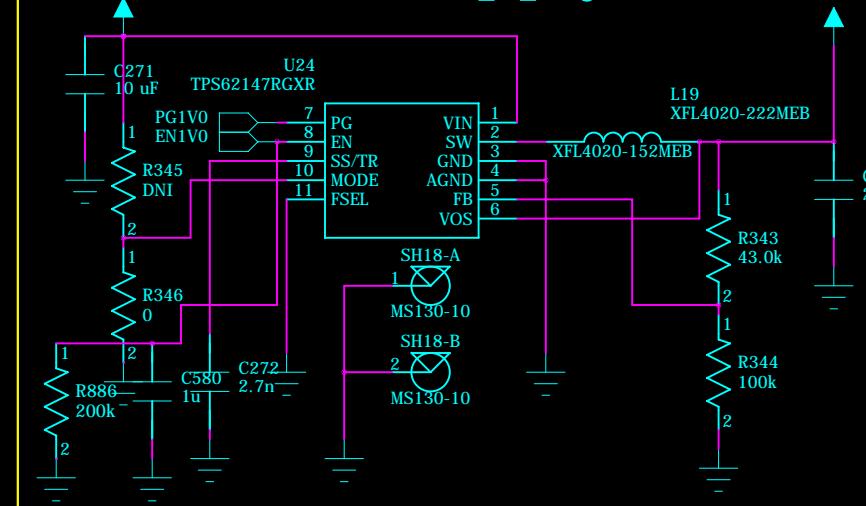
## 1.8V supply



## 3.3V supply (always on)



## FPGA core supply (1.0V)



really 53.6k

Ohio State University

POWER

COMPANY:	Ohio State University		
SHEET:	POWER		
DRAWN:	PSA	DATED:	1/22/20
CHECKED:	PSA	DATED:	2/27/20
QUALITY CONTROL:	N/A	DATED:	N/A
RELEASED:	N/A	DATED:	N/A
SCALE:	<Scale>		
REV:	A		
CODE:	C	SIZE:	DESIGN
	RADIANT		
SIZE:	4	DESIGN	RADIANT
SCALE:	80	74	

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## REVISION RECORD

LTR	ECO NO:	APPROVED:	DATE:

Filtering/bypass capacitors

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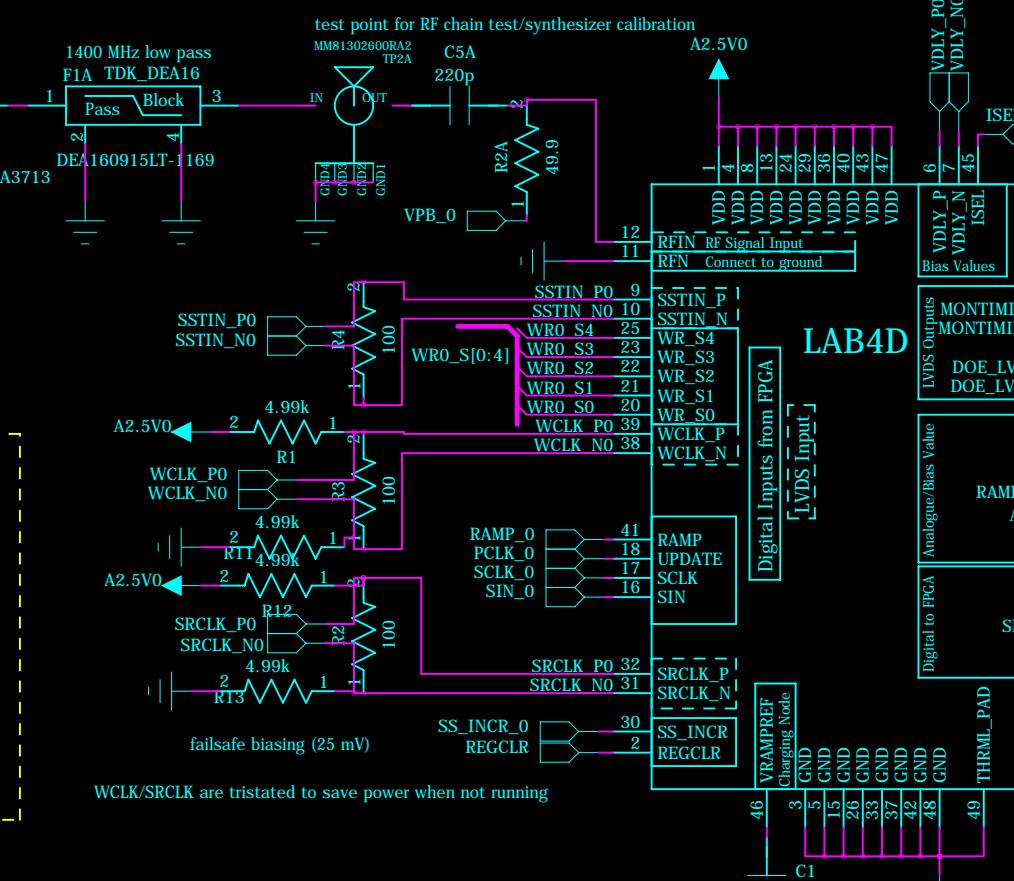
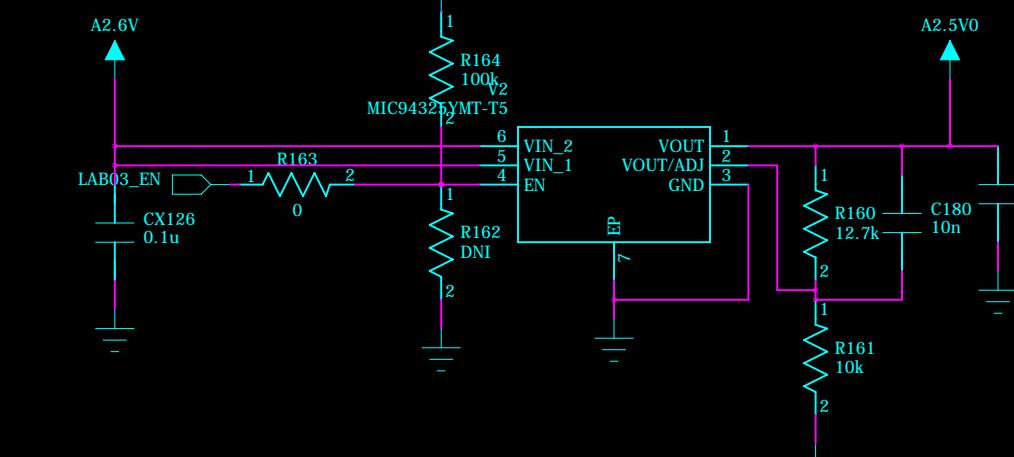
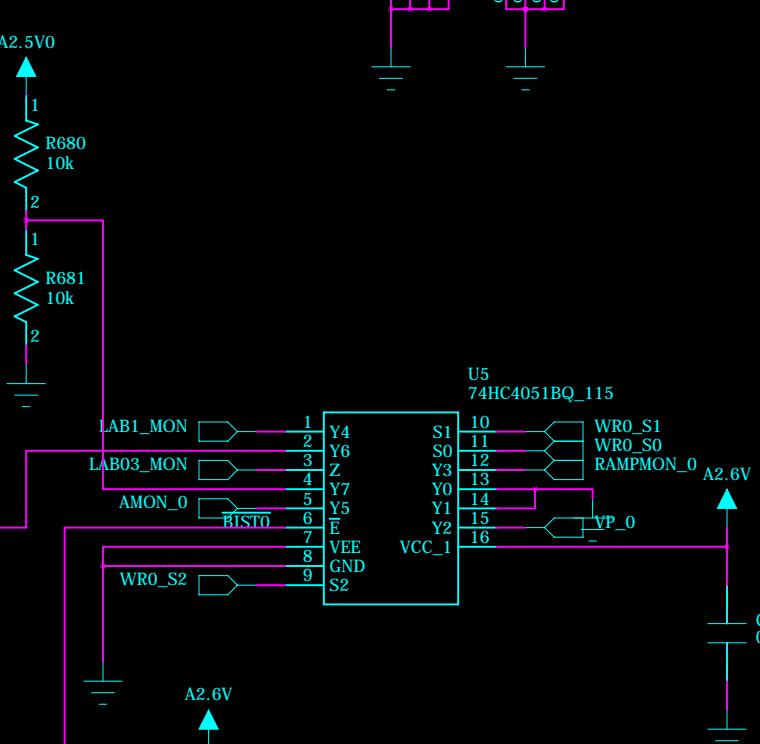
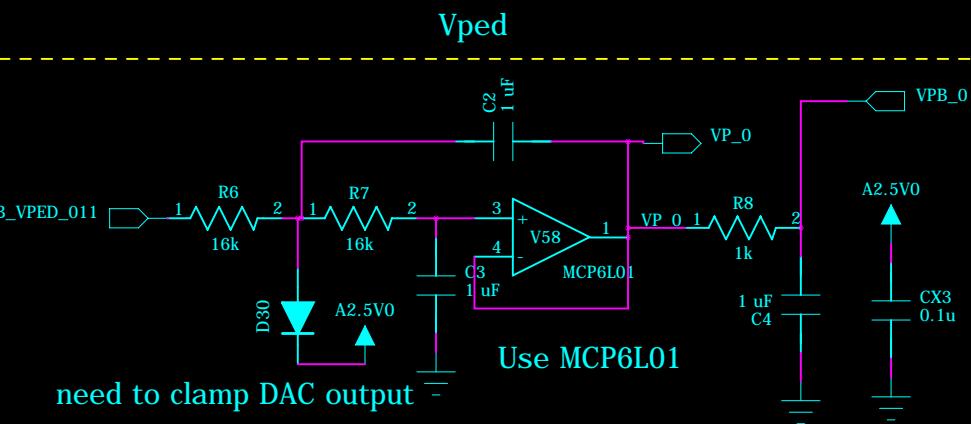
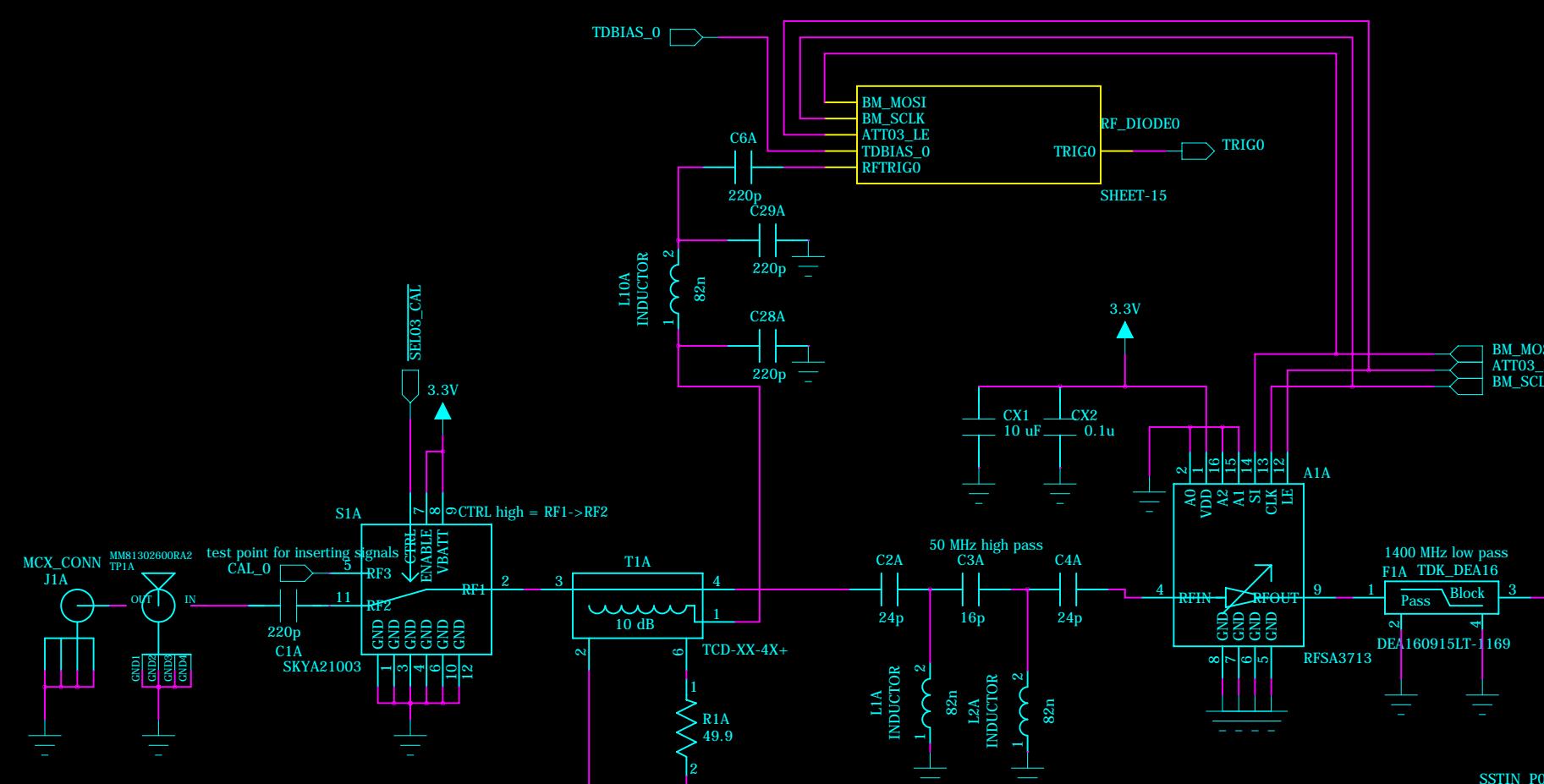
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Ohio State University

RF\_CHANNEL0

DRAWN:	PSA	DATED:	1/22/20
CHECKED:	PSA	DATED:	2/27/20
QUALITY CONTROL:	N/A	DATED:	N/A
RELEASED:	N/A	DATED:	N/A

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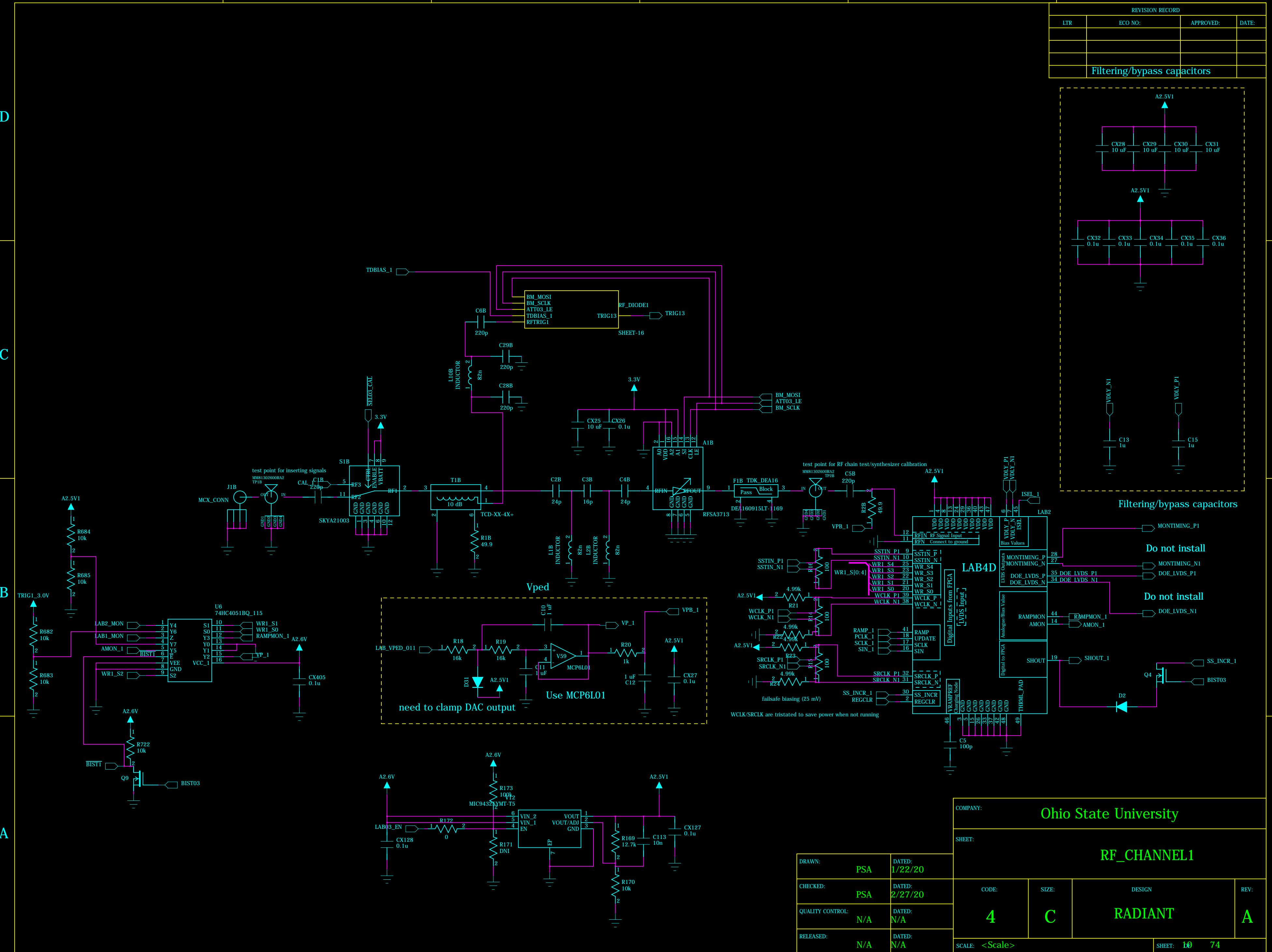
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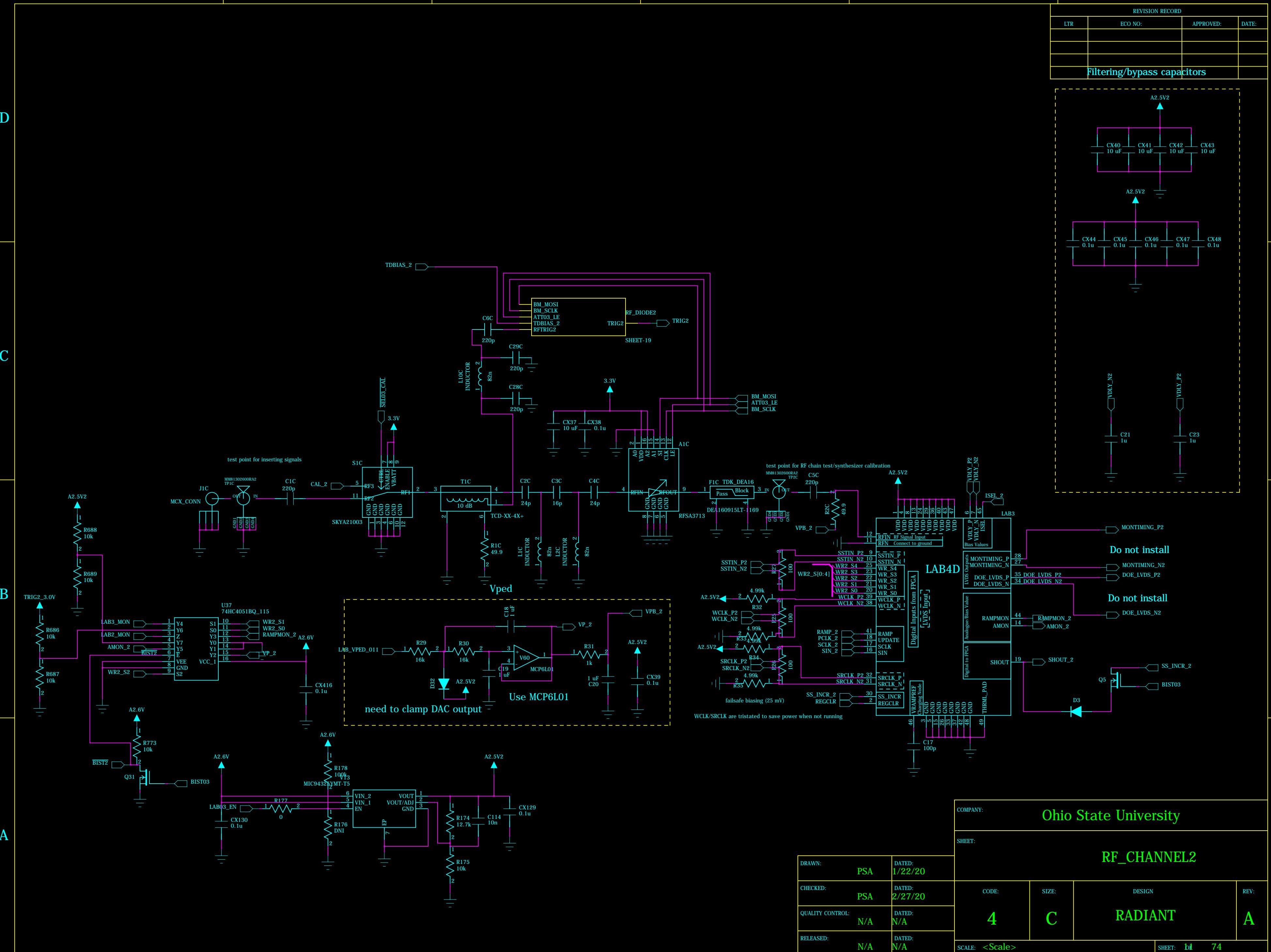
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## REVISION RECORD

LTR	ECO NO:	APPROVED:	DATE:

Filtering/bypass capacitors

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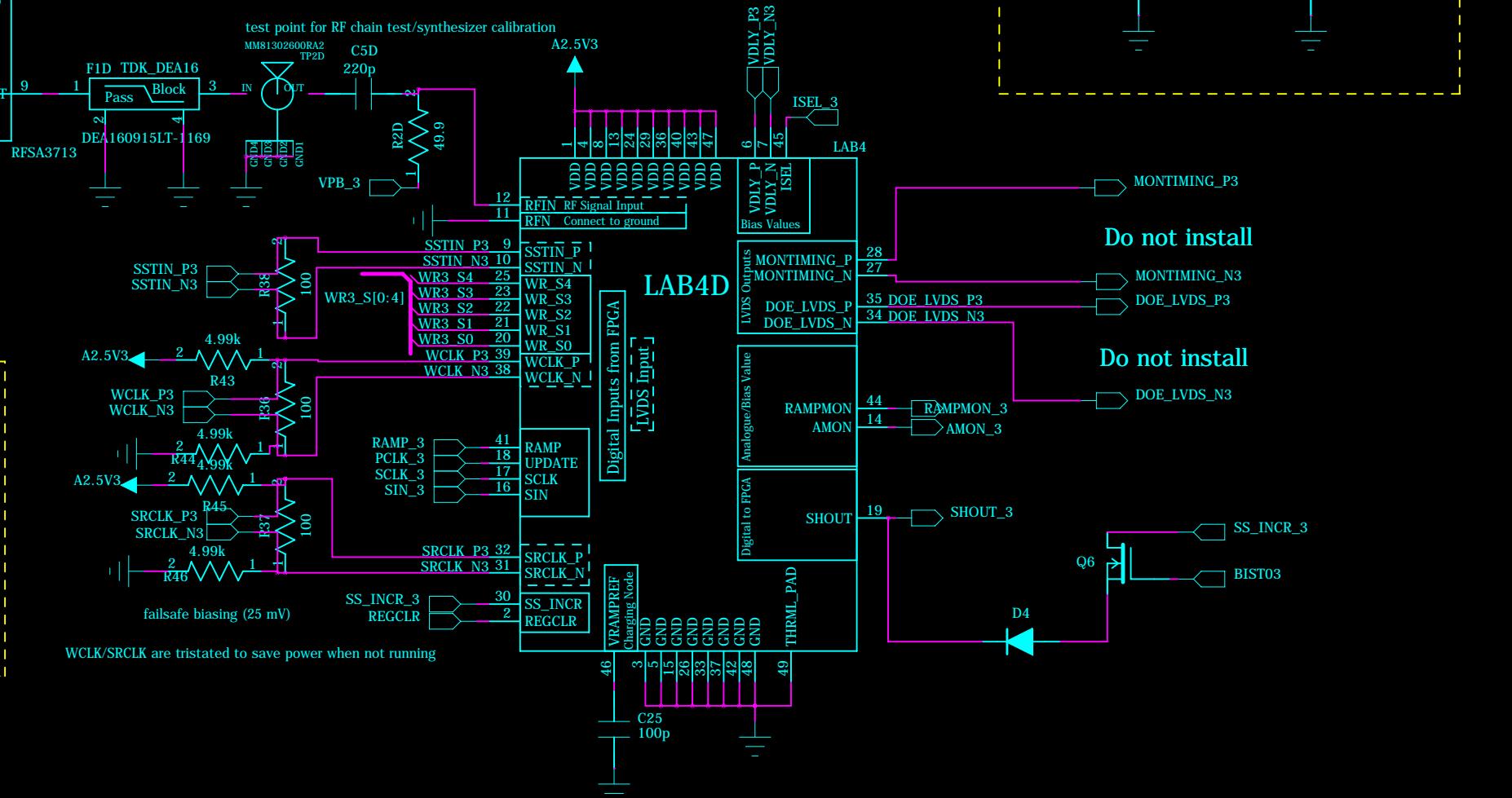
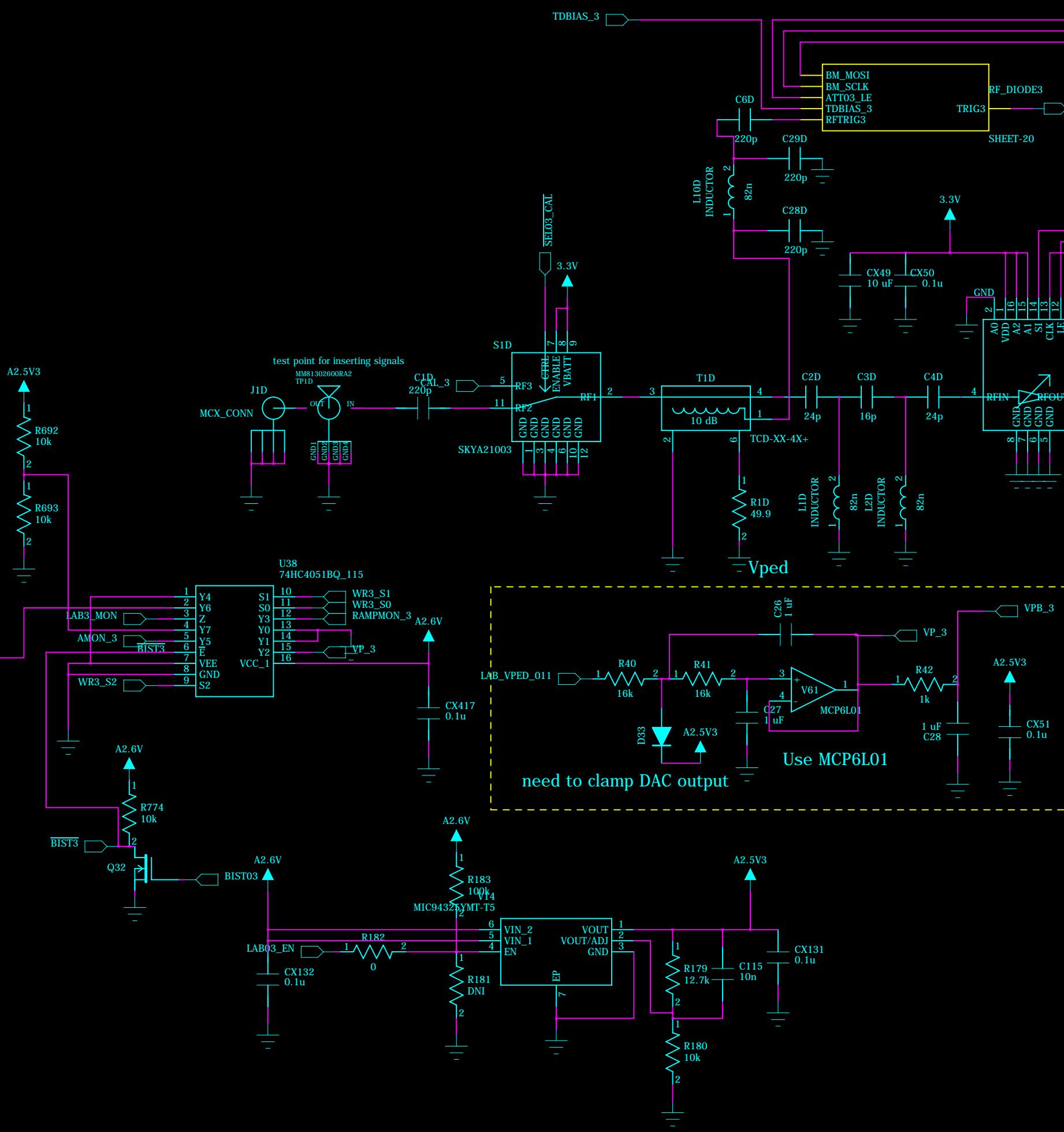
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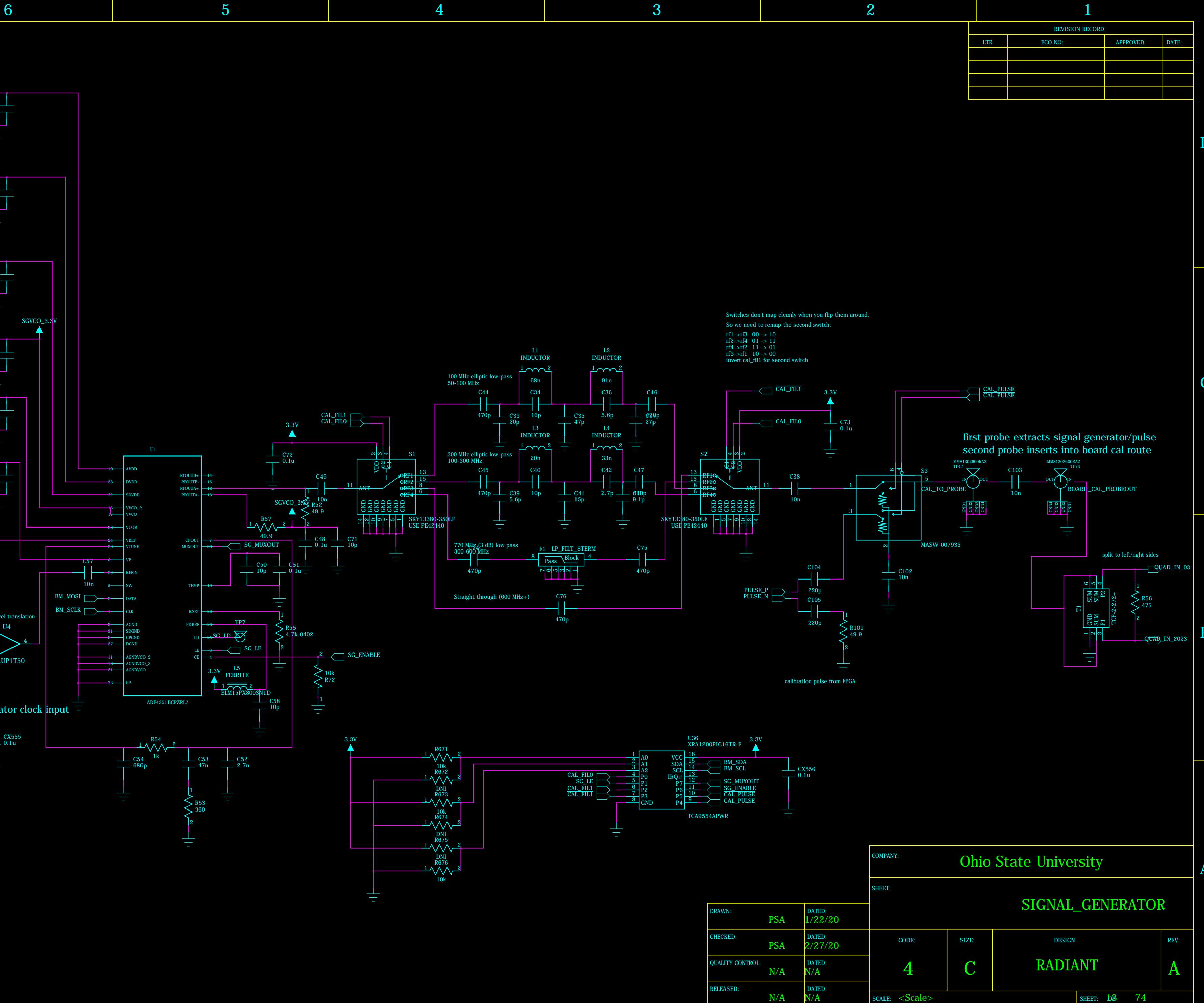
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QUALITY CONTROL:	N/A	DATED:	N/A
RELEASED:	N/A	DATED:	N/A

COMPANY: Ohio State University

SHEET: RF\_CHANNEL3

CODE: 4 SIZE: C DESIGN: RADIANT REV: A

SCALE: <Scale> SHEET: b2 74



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REVISION RECORD			
LTR	ECO NO:	APPROVED:	DATE:

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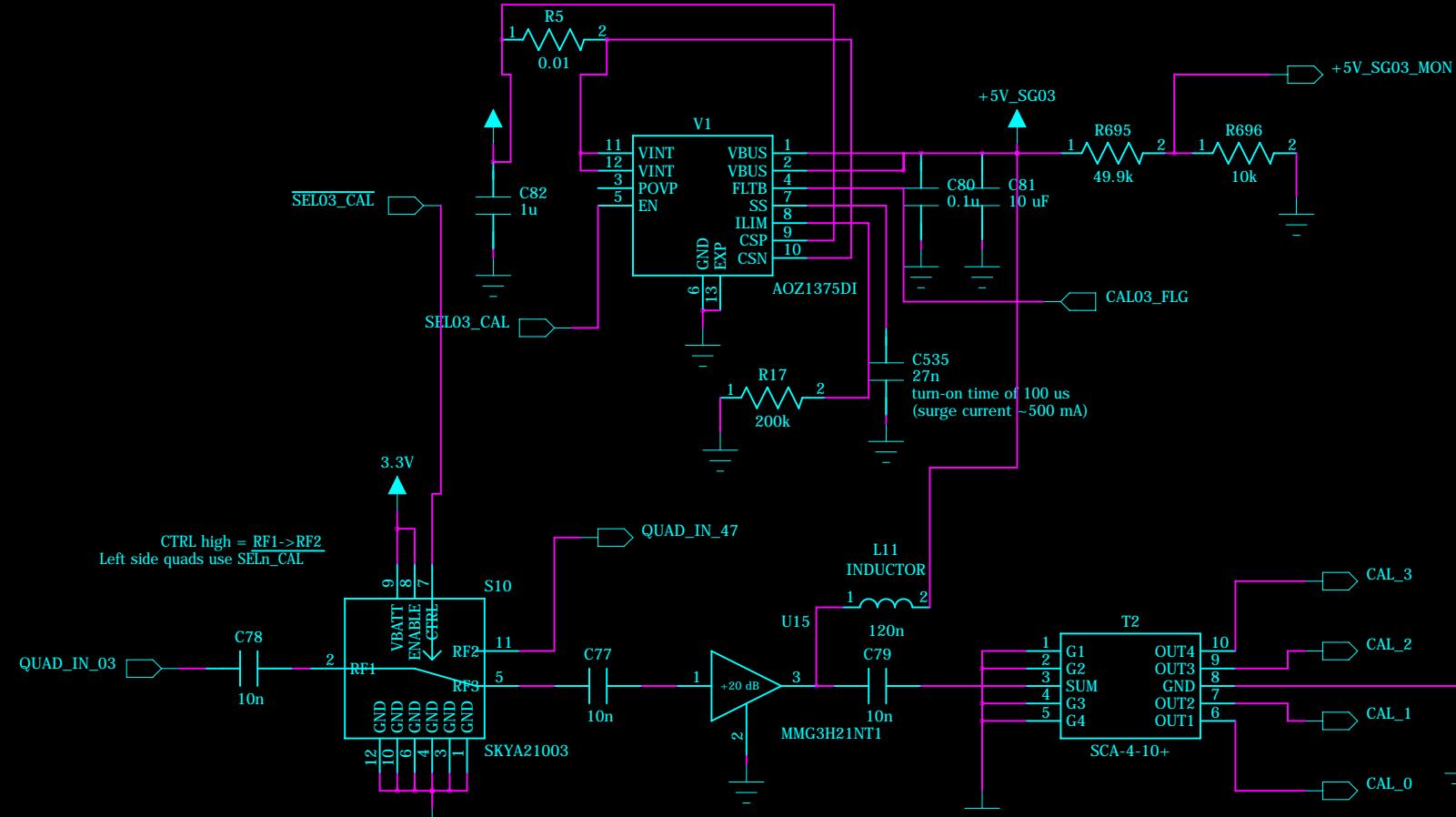
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COMPANY:	Ohio State University		
SHEET:	QUAD_SIG_GENERATOR 0		
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CHECKED:	PSA	DATED:	2/27/20
QUALITY CONTROL:	N/A	DATED:	N/A
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REVISION RECORD

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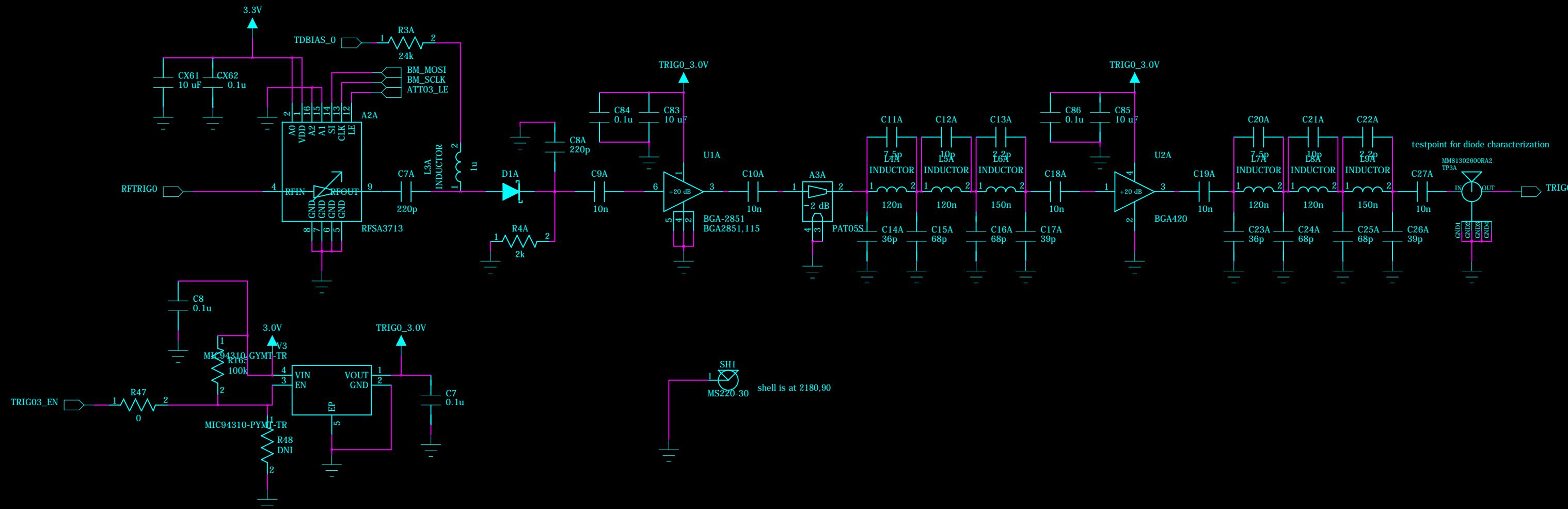
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COMPANY:

Ohio State University

SHEET:

RF\_DIODE0

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CHECKED:	PSA	DATED:	2/27/20	
QUALITY CONTROL:	N/A	DATED:	N/A	
RELEASED:	N/A	DATED:	N/A	

SCALE: &lt;Scale&gt; SHEET: b5 74

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## REVISION RECORD

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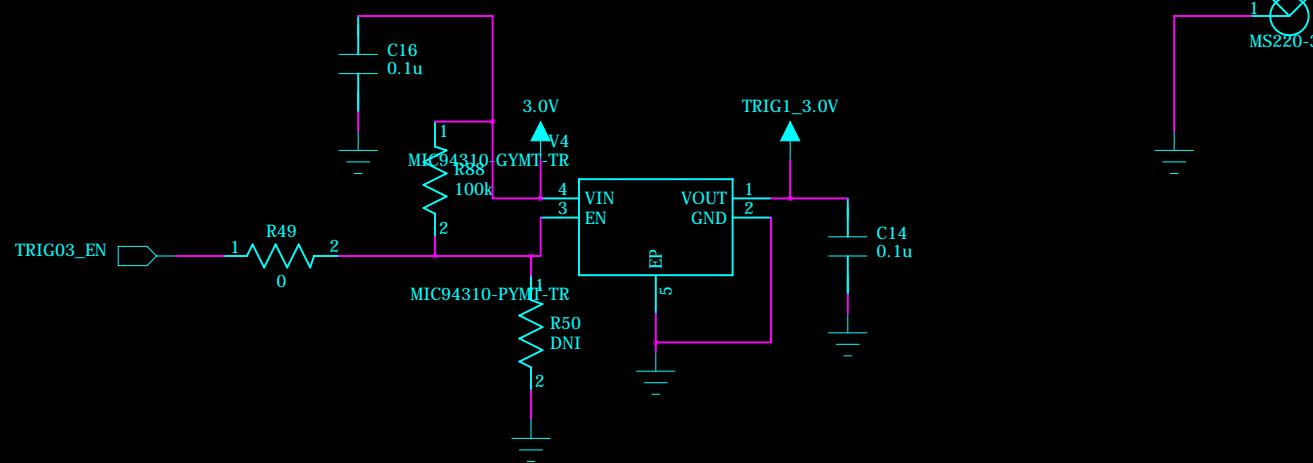
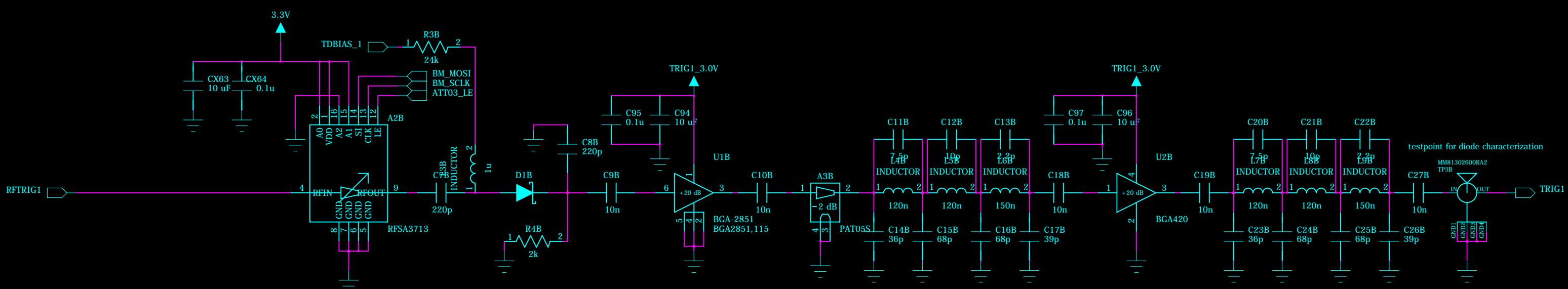
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COMPANY:	Ohio State University		
SHEET:	RF_DIODE1		
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CHECKED:	PSA	DATED:	2/27/20
QUALITY CONTROL:	N/A	DATED:	N/A
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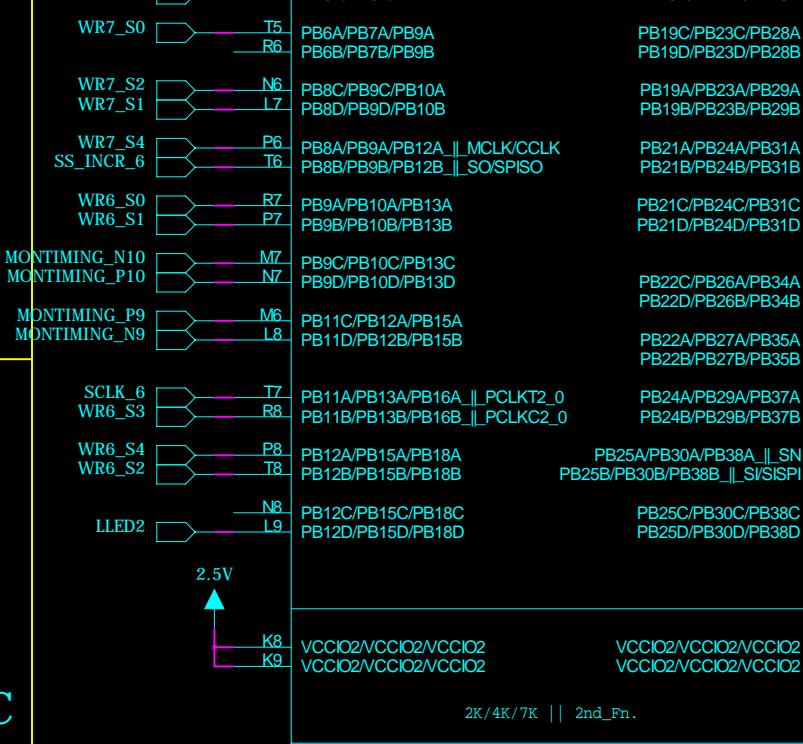
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REVISION RECORD

LTR	ECO NO:	APPROVED:	DATE:

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COMPANY:	Ohio State University		
SHEET:	RF_LEFT		
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CHECKED:	PSA	DATED:	2/27/20
QUALITY CONTROL:	N/A	DATED:	N/A
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## REVISION RECORD

LTR	ECO NO:	APPROVED:	DATE:

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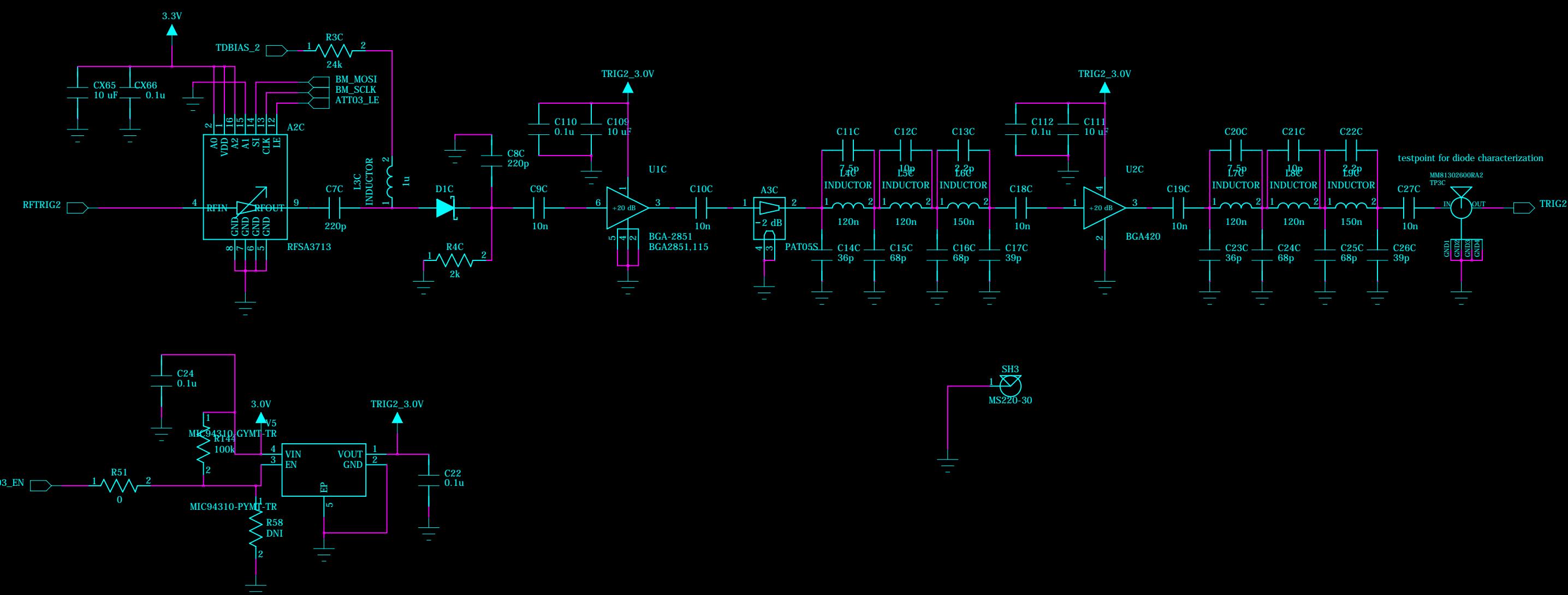
C

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A



COMPANY:

Ohio State University

SHEET:

RF\_DIODE2

DRAWN:	PSA	DATED:	1/22/20	CODE: 4 SIZE: C DESIGN: RADIANT REV: A
CHECKED:	PSA	DATED:	2/27/20	
QUALITY CONTROL:	N/A	DATED:	N/A	
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SCALE: &lt;Scale&gt; SHEET: b6 74

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## REVISION RECORD

LTR	ECO NO:	APPROVED:	DATE:

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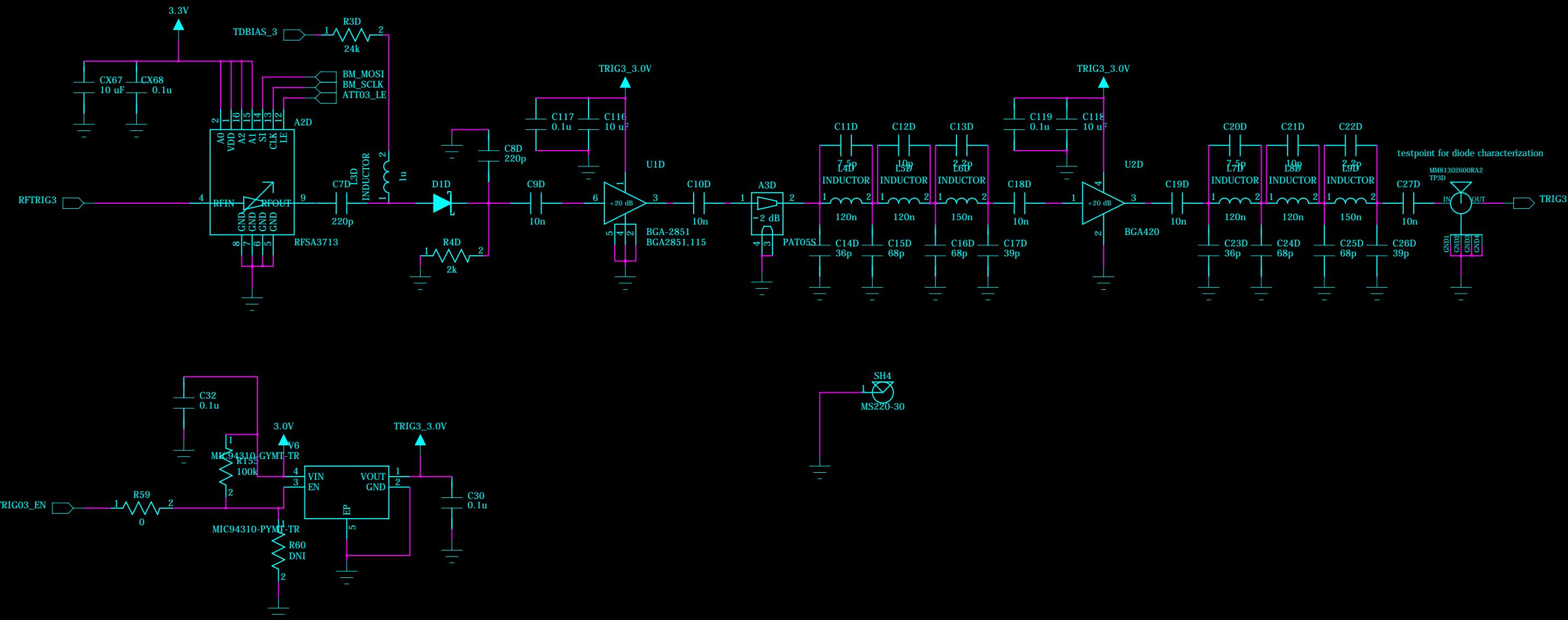
C

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A



COMPANY:	Ohio State University		
SHEET:	RF_DIODE3		
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CHECKED:	PSA	DATED:	2/27/20
QUALITY CONTROL:	N/A	DATED:	N/A
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## REVISION RECORD

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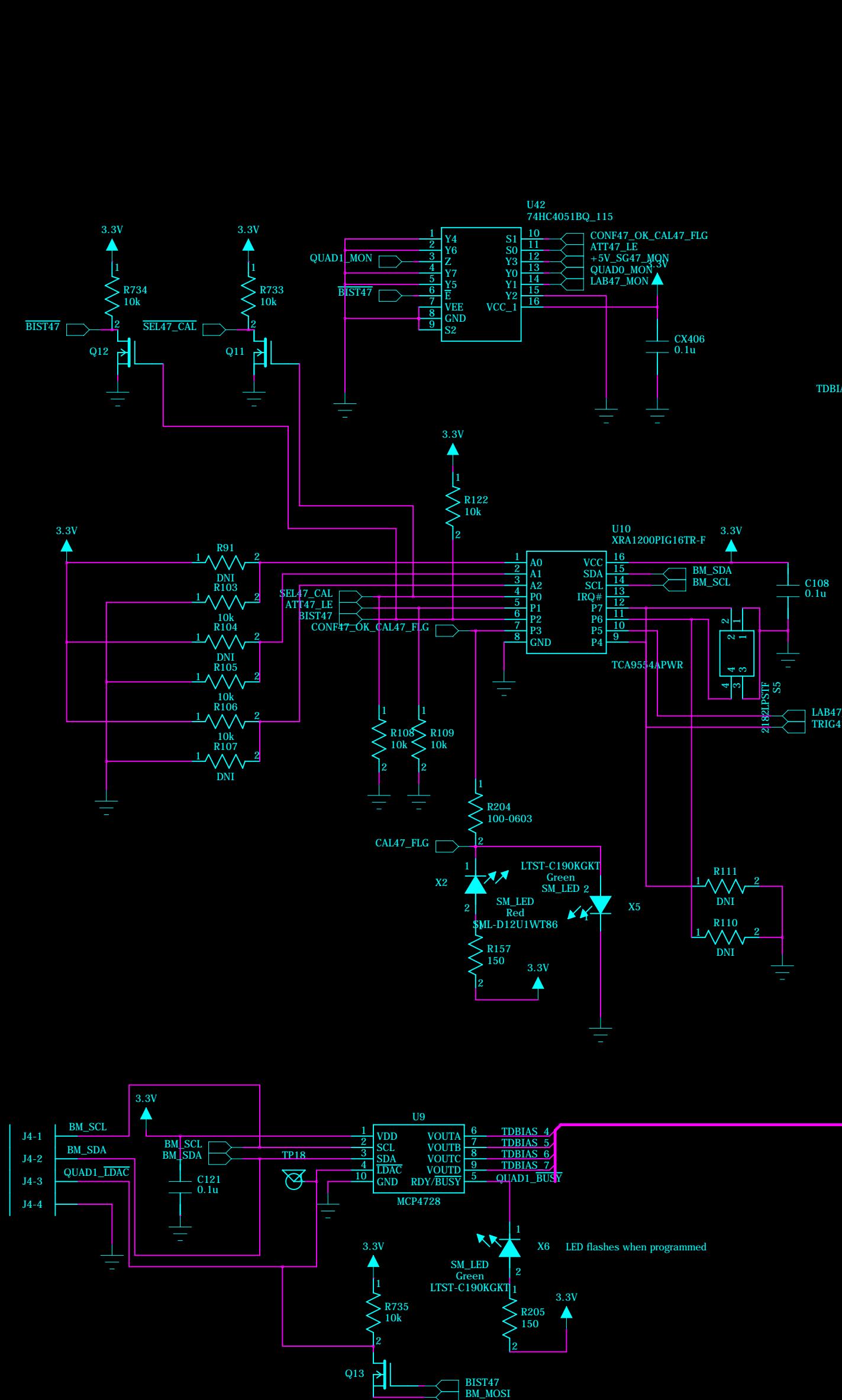
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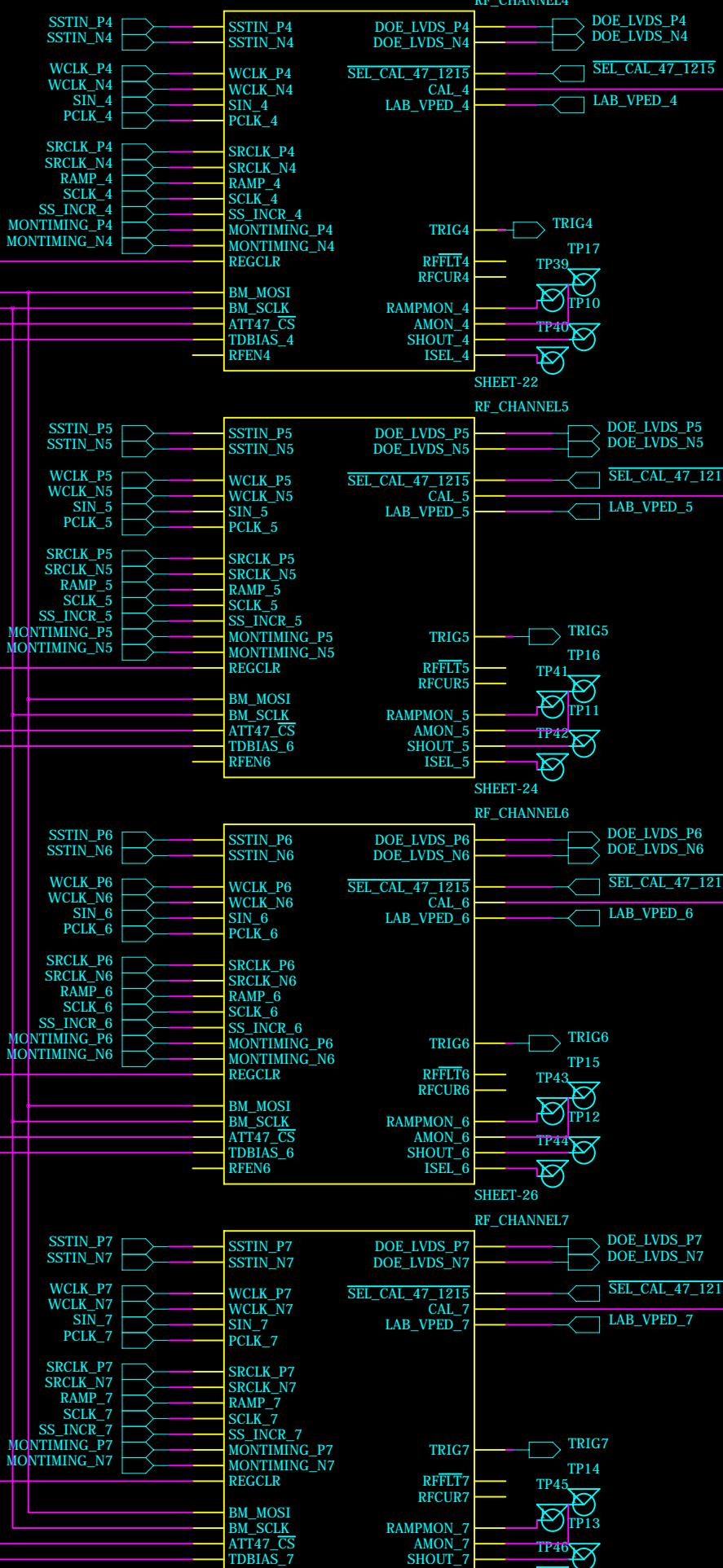
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TDBIAS 4

TDBIAS 6

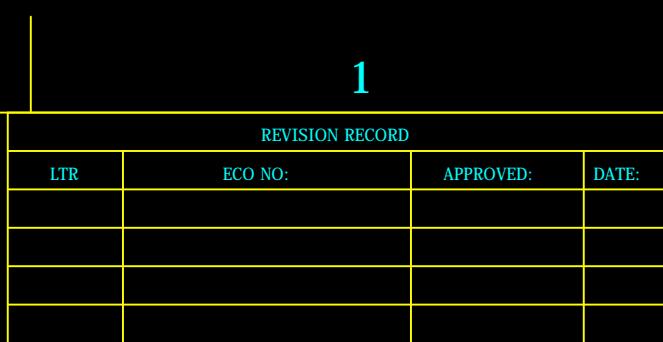
TDBIAS 7



TDBIAS 4

TDBIAS 6

TDBIAS 7



COMPANY:	Ohio State University		
SHEET:	RF_QUAD1		
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QUALITY CONTROL:	N/A	DATED:	N/A
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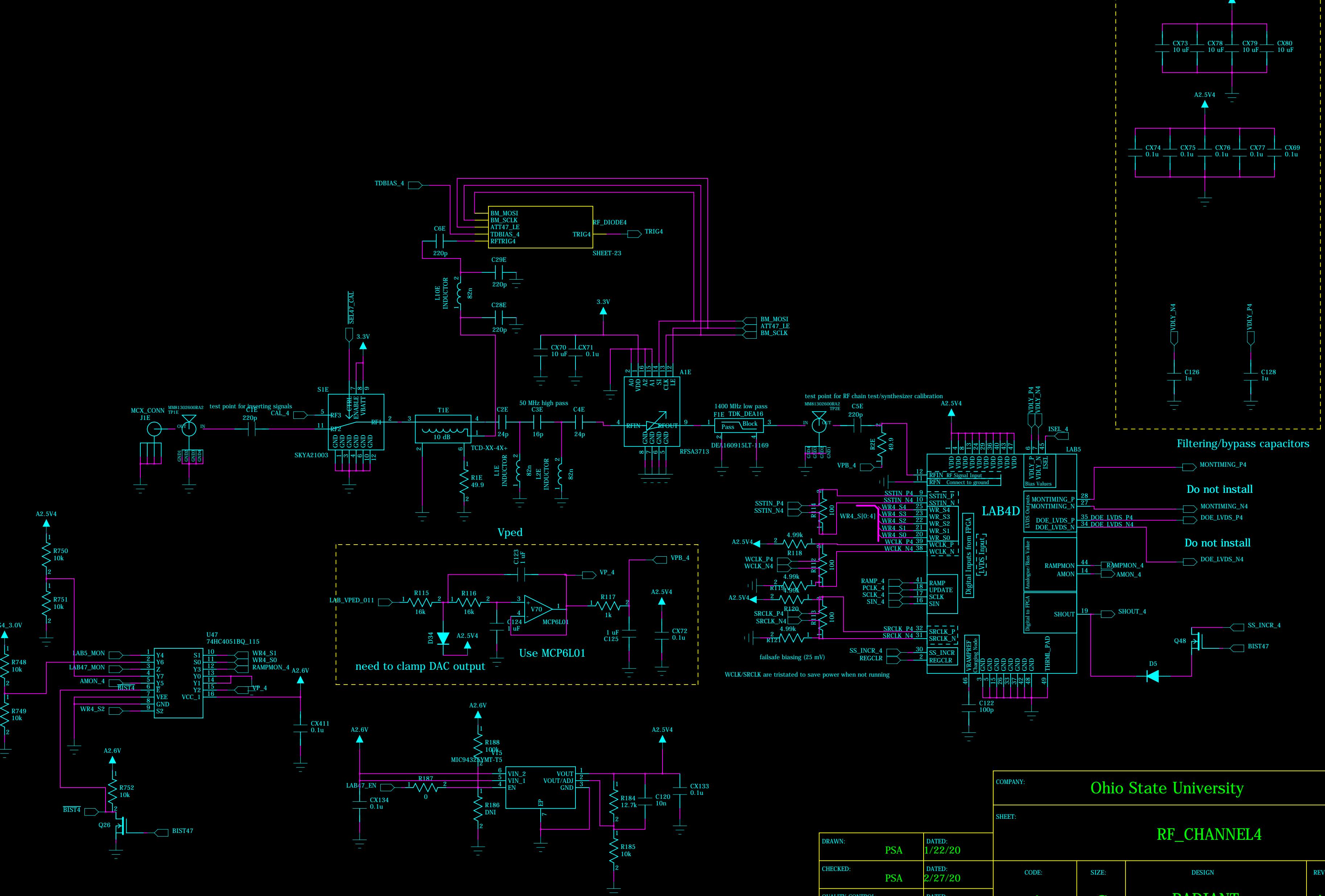
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## REVISION RECORD

LTR	ECO NO:	APPROVED:	DATE:

Filtering/bypass capacitors



DRAWN:	PSA	DATED:	1/22/20	CODE:	C	SIZE:	DESIGN	RADIANT	REV:
CHECKED:	PSA	DATED:	2/27/20	4	C				A
QUALITY CONTROL:	N/A	DATED:	N/A						
RELEASED:	N/A	DATED:	N/A	SCALE: <Scale>					

Sheet: 28 74

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## REVISION RECORD

LTR	ECO NO:	APPROVED:	DATE:

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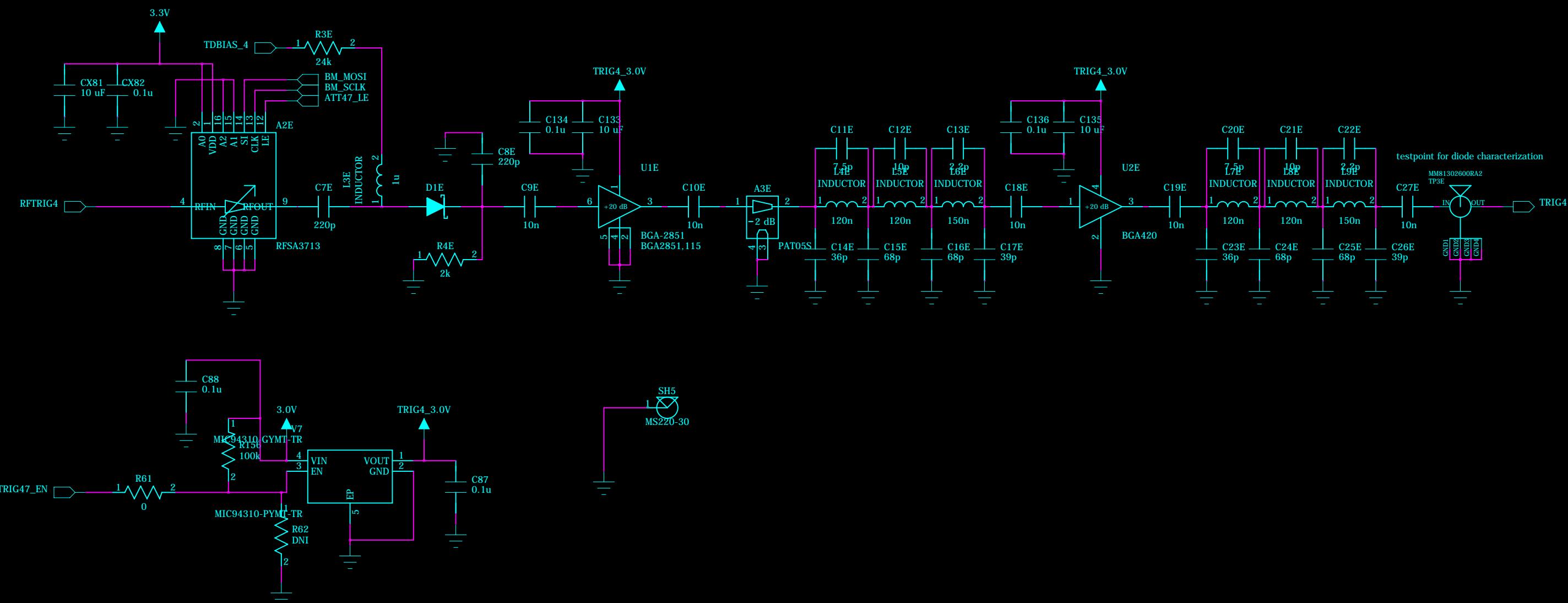
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COMPANY:

Ohio State University

SHEET:

RF\_DIODE4

DRAWN:	PSA	DATED:	1/22/20	CODE: 4 SIZE: C DESIGN: RADIANT REV: A
CHECKED:	PSA	DATED:	2/27/20	
QUALITY CONTROL:	N/A	DATED:	N/A	
RELEASED:	N/A	DATED:	N/A	

SCALE: &lt;Scale&gt; SHEET: 28 74

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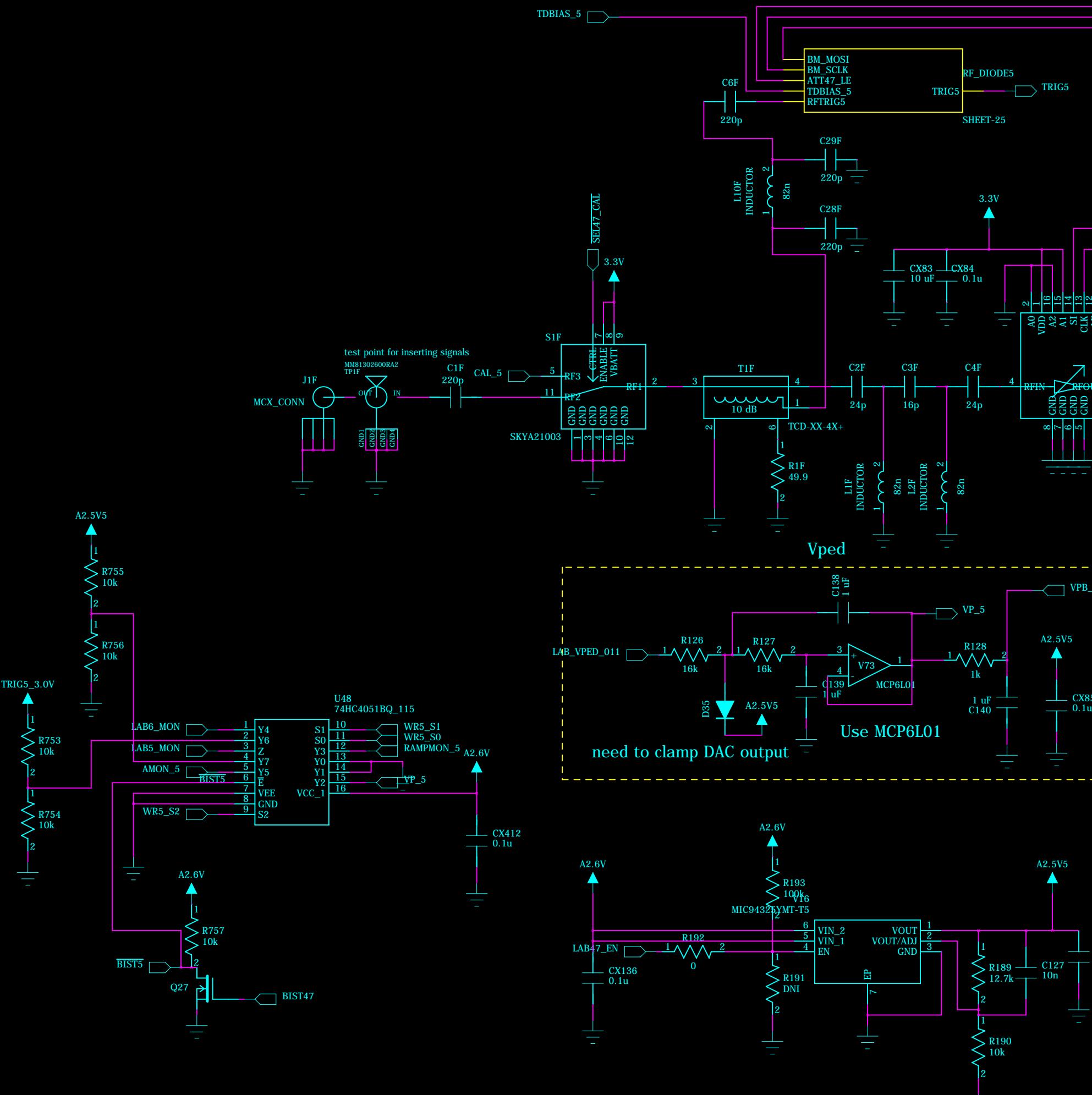
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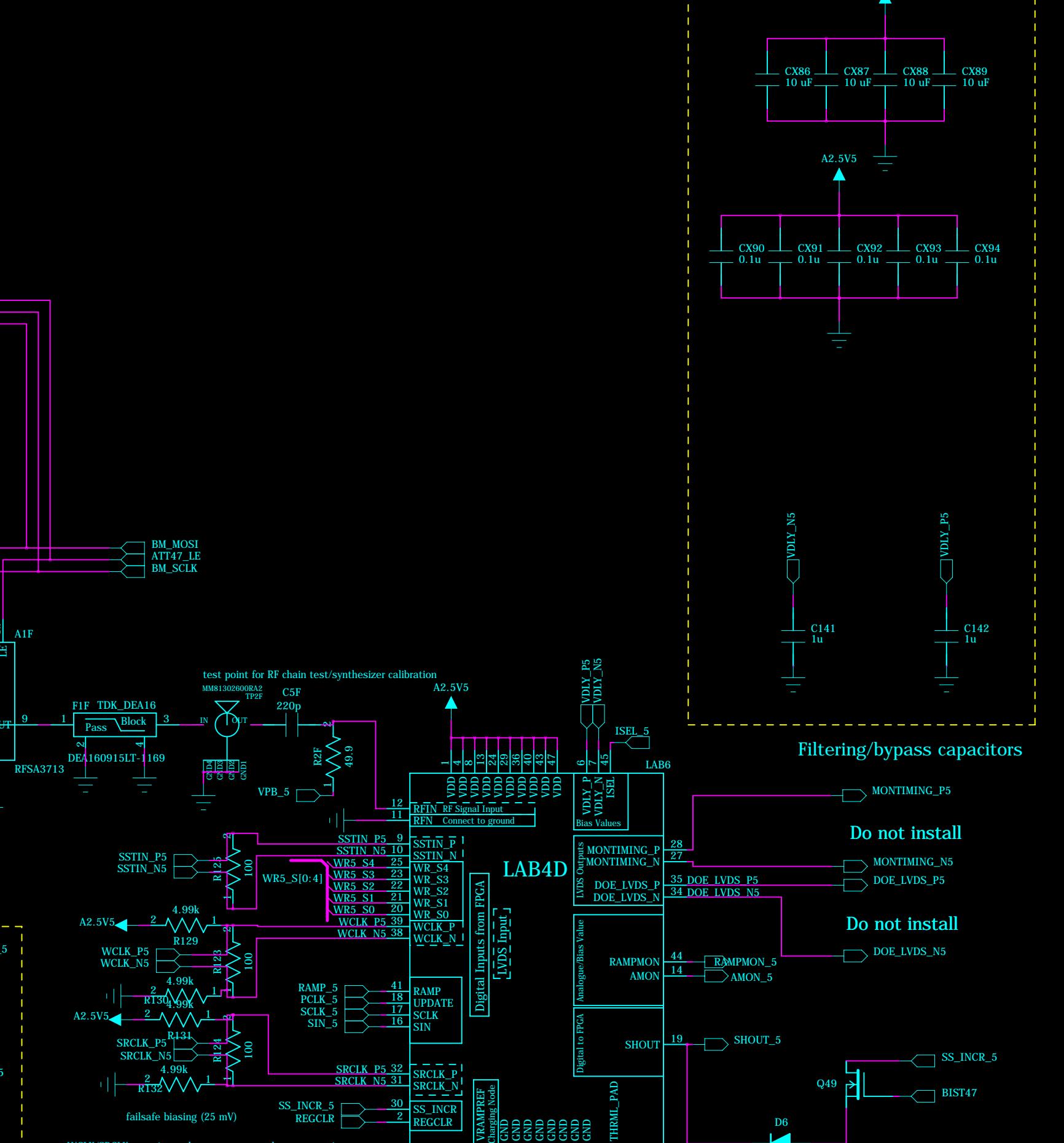
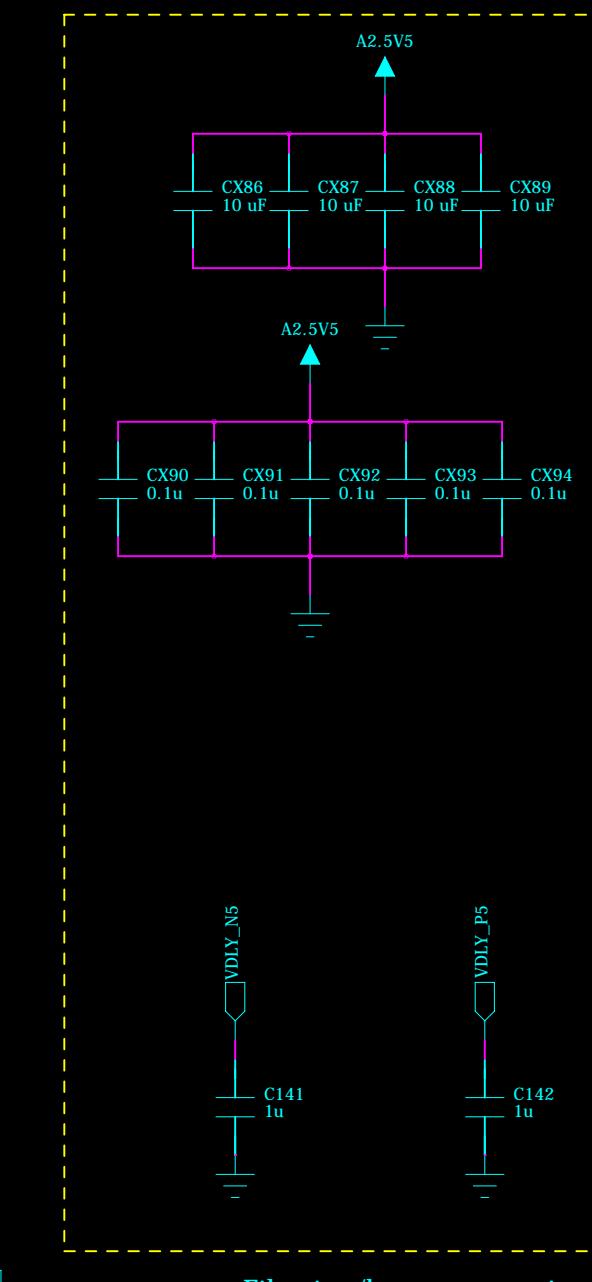
A



failsafe biasing (25 mV)

WCLK/SRCLK are tristated to save power when not running

COMPANY:	Ohio State University		
SHEET:	RF_CHANNEL5		
DRAWN:	PSA	DATED:	1/22/20
CHECKED:	PSA	DATED:	2/27/20
QUALITY CONTROL:	N/A	DATED:	N/A
RELEASED:	N/A	DATED:	N/A
SCALE:	<Scale>	CODE:	4
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		DESIGN:	RADIANT
		REV:	A
Sheet:	24	Page:	74



failsafe biasing (25 mV)

WCLK/SRCLK are tristated to save power when not running

6

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## REVISION RECORD

LTR	ECO NO:	APPROVED:	DATE:

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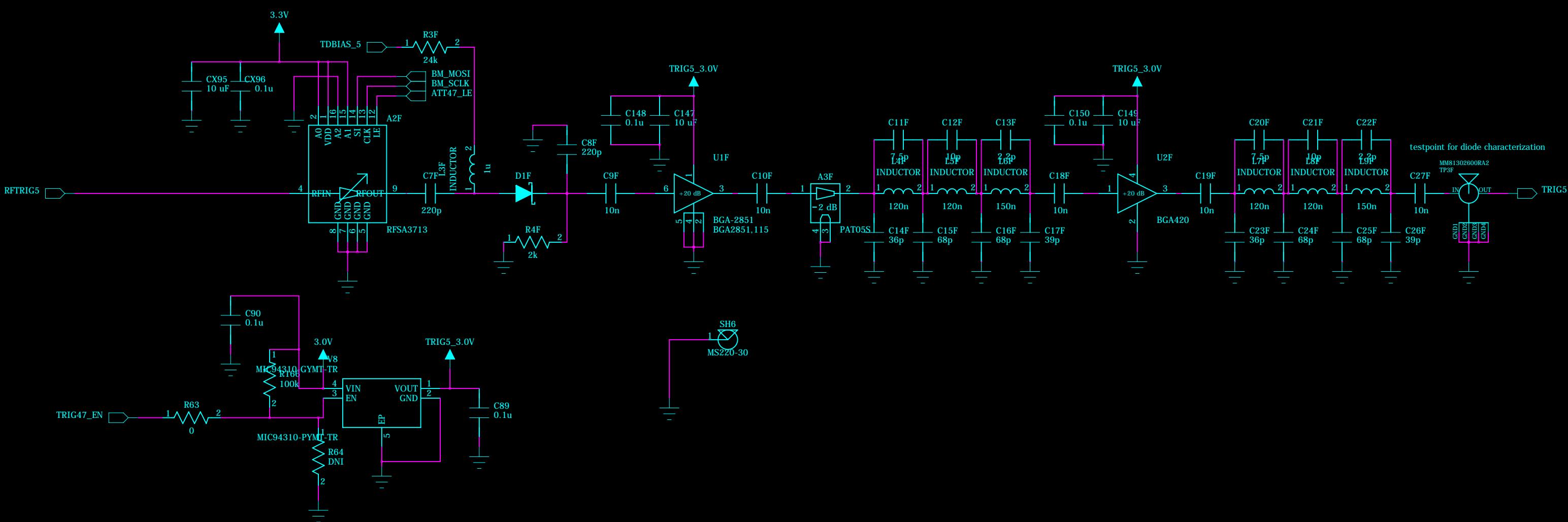
C

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A



COMPANY:

Ohio State University

SHEET:

RF\_DIODE5

DRAWN:	PSA	DATED:	1/22/20	CODE: 4 SIZE: C DESIGN: RADIANT REV: A
CHECKED:	PSA	DATED:	2/27/20	
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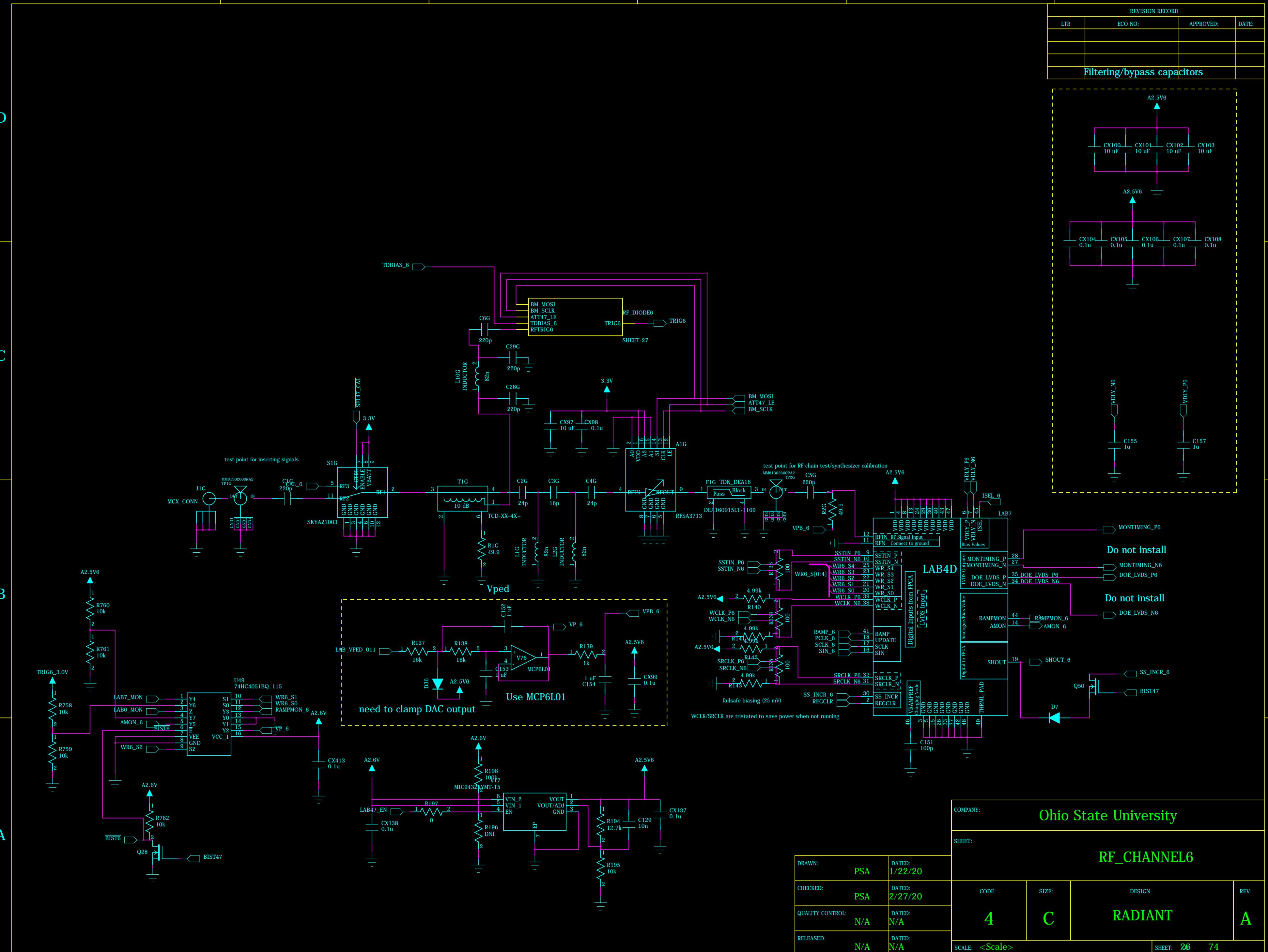
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REVISION RECORD

LTR	ECO NO:	APPROVED:	DATE:

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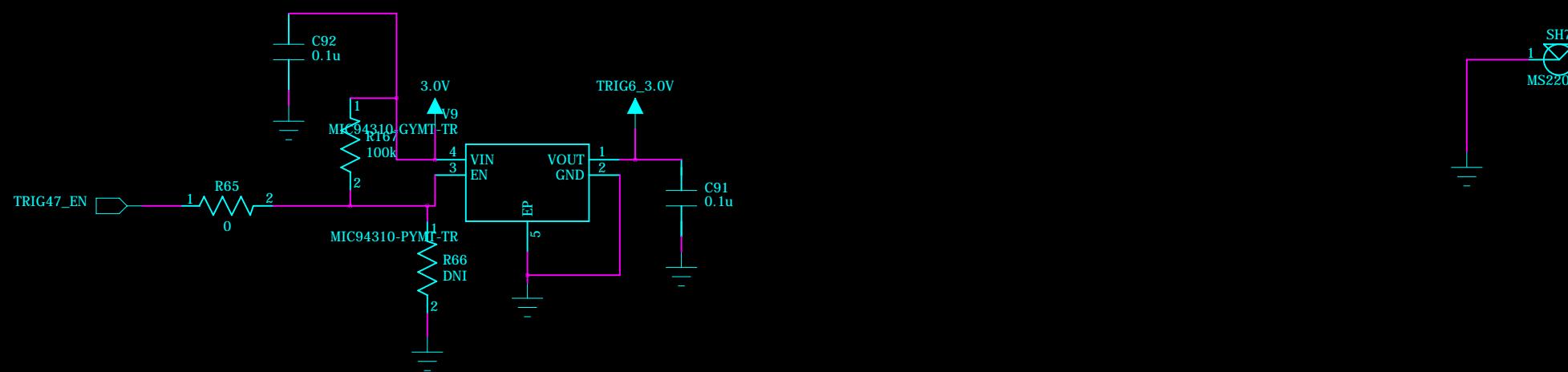
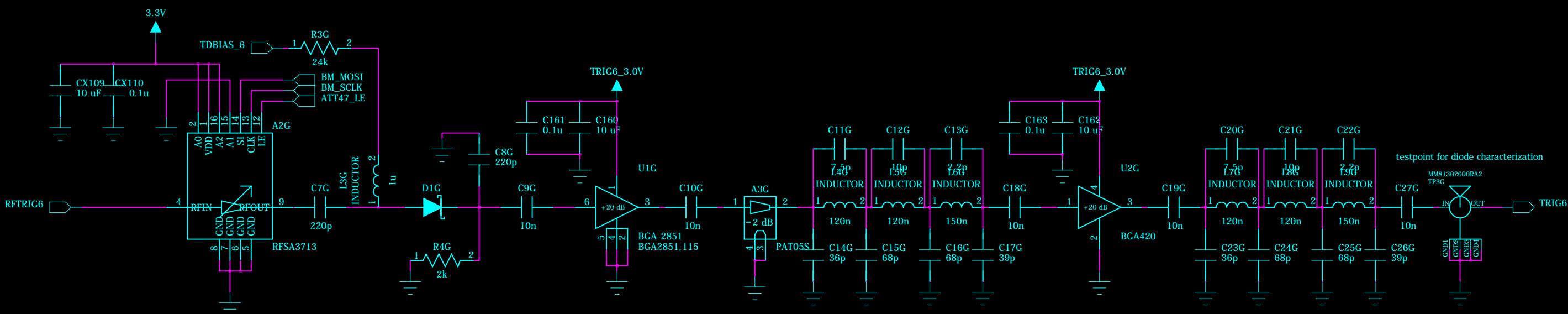
C

B

B

A

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COMPANY:	Ohio State University		
SHEET:	RF_DIODE6		
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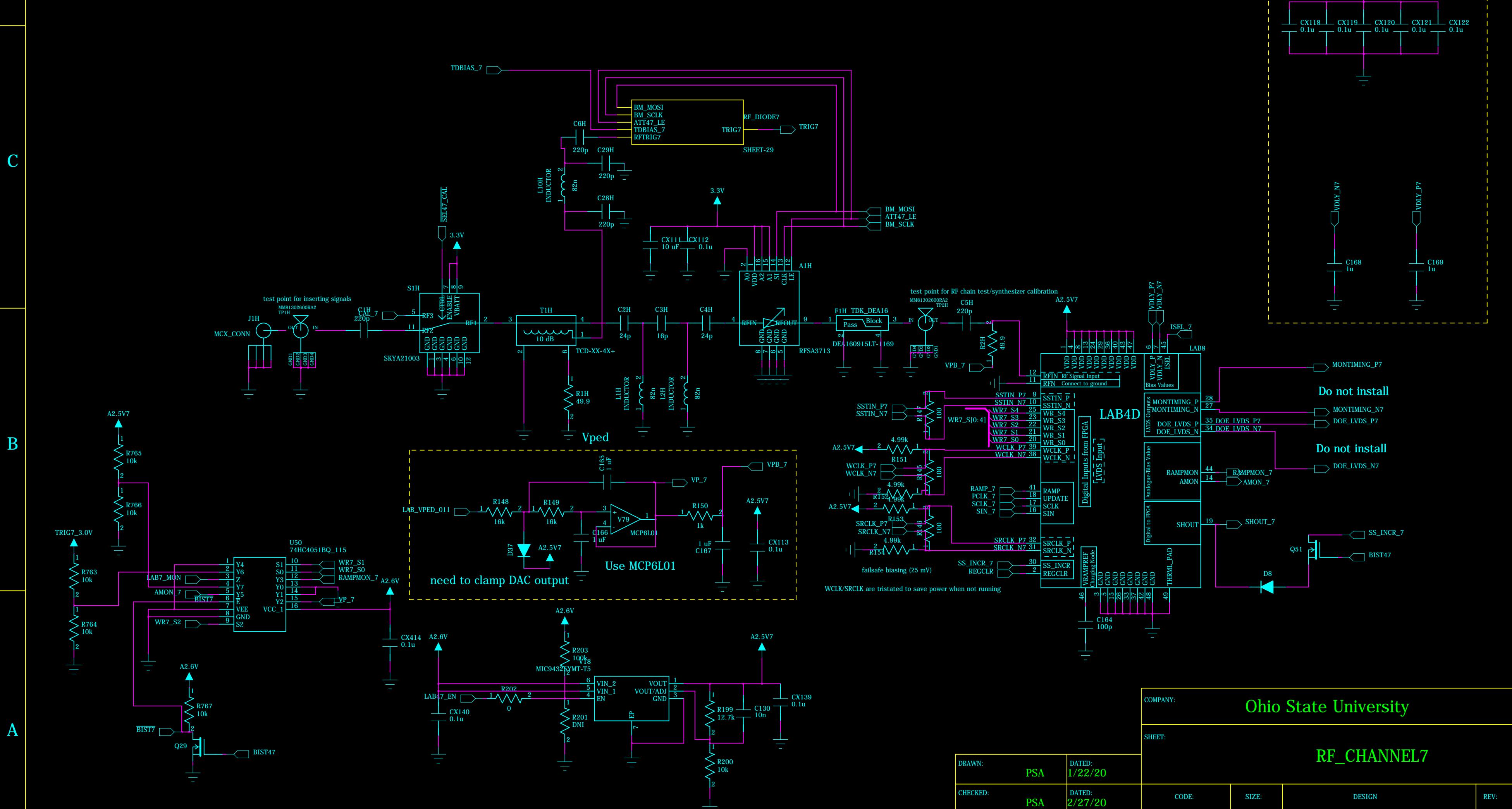
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LTR	ECO NO:	APPROVED:	DATE:

Filtering/bypass capacitors

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COMPANY:		Ohio State University			
SHEET:		RF_CHANNEL7			
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QUALITY CONTROL:	N/A	DATED:	N/A	DESIGN:	RADIANT
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REVISION RECORD

LTR	ECO NO:	APPROVED:	DATE:

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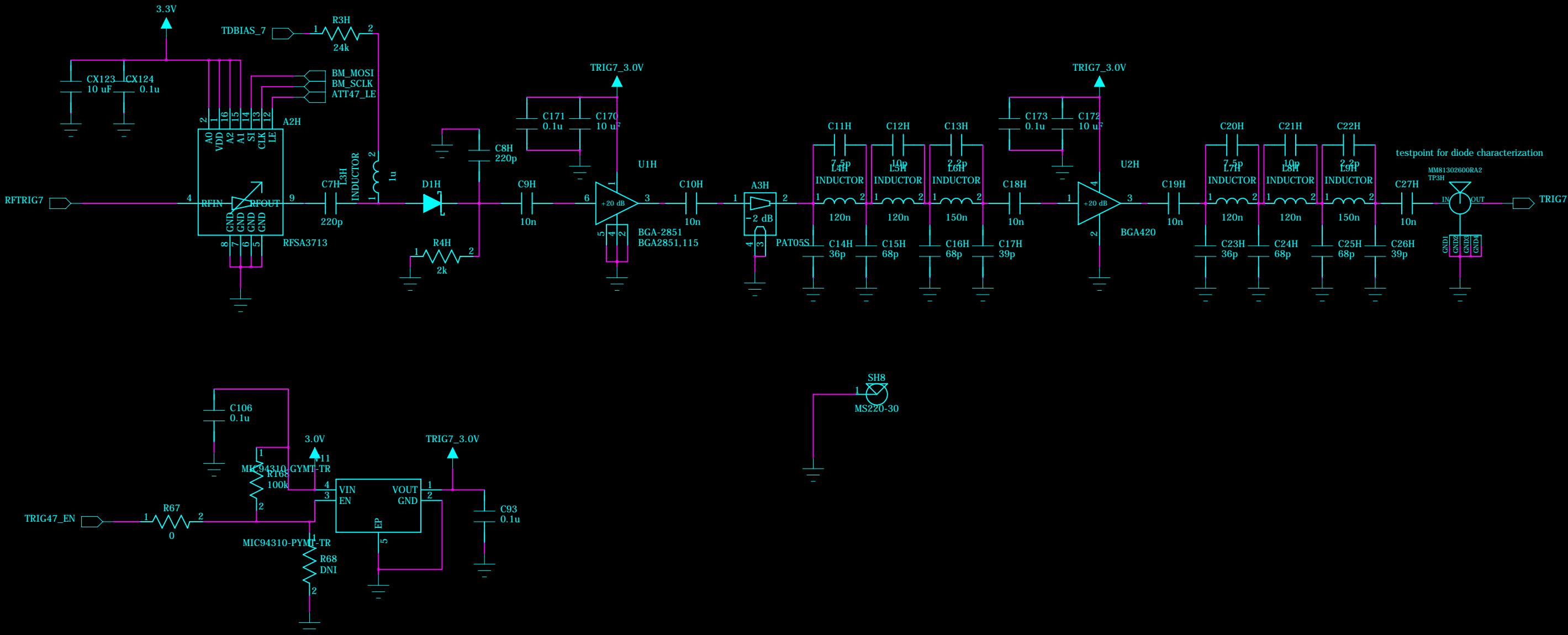
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COMPANY:

Ohio State University

SHEET:

RF\_DIODE7

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SCALE: &lt;Scale&gt; SHEET: 29 74

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REVISION RECORD

LTR	ECO NO:	APPROVED:	DATE:

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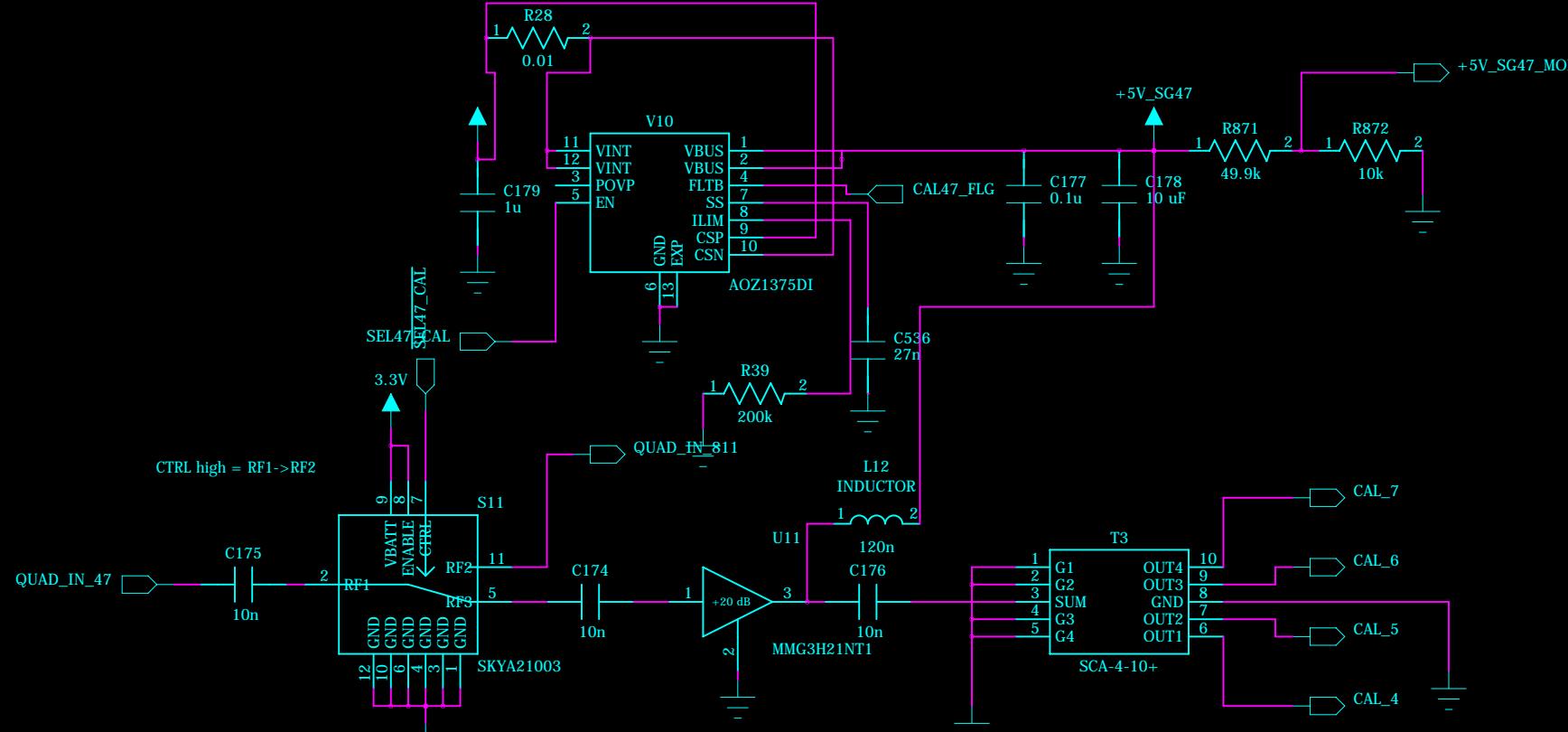
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COMPANY:	Ohio State University		
SHEET:	QUAD_SIG_GENERATOR 1		
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CHECKED:	PSA	DATED:	2/27/20
QUALITY CONTROL:	N/A	DATED:	N/A
RELEASED:	N/A	DATED:	N/A
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LTR	ECO NO:	APPROVED:	DATE:

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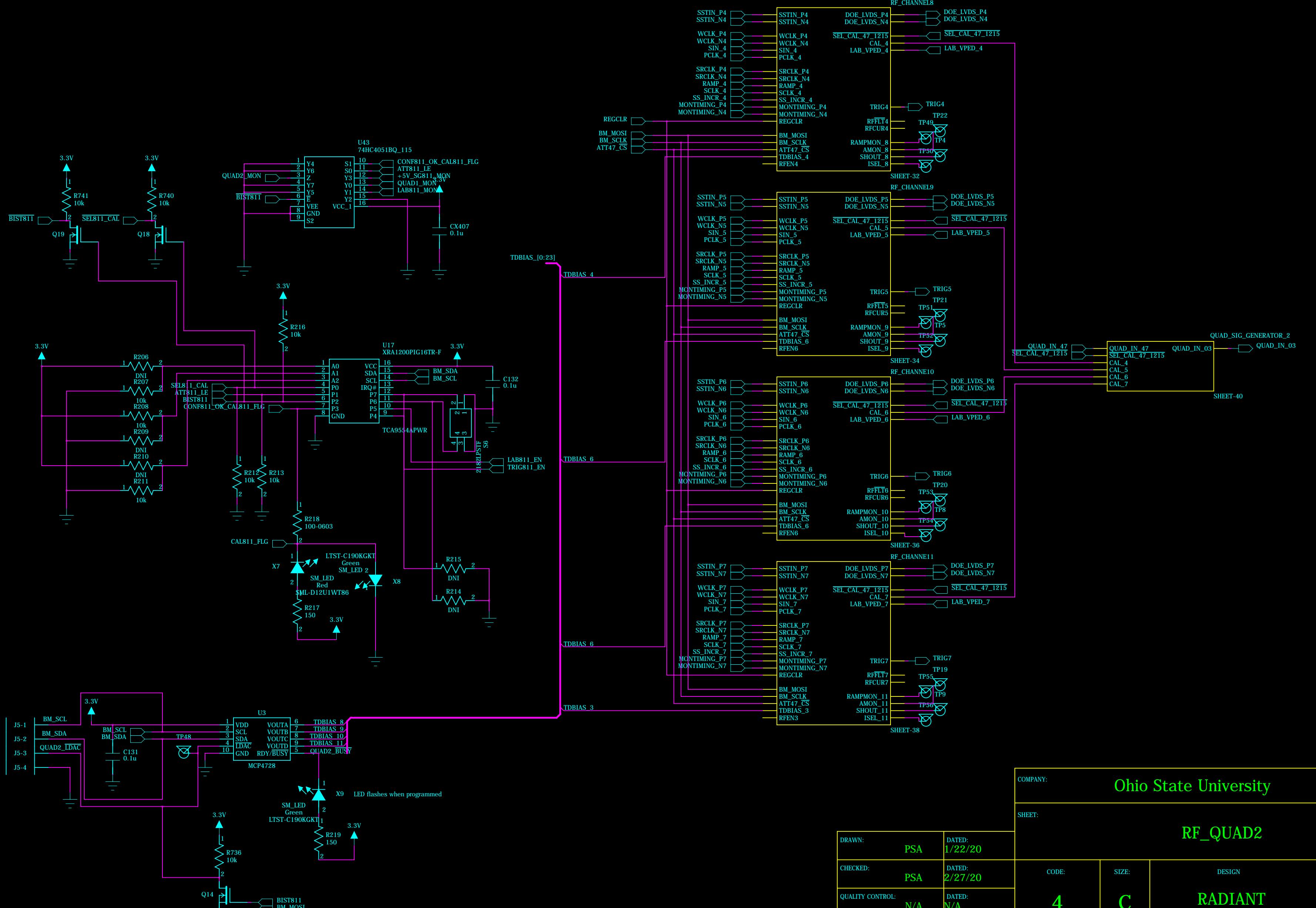
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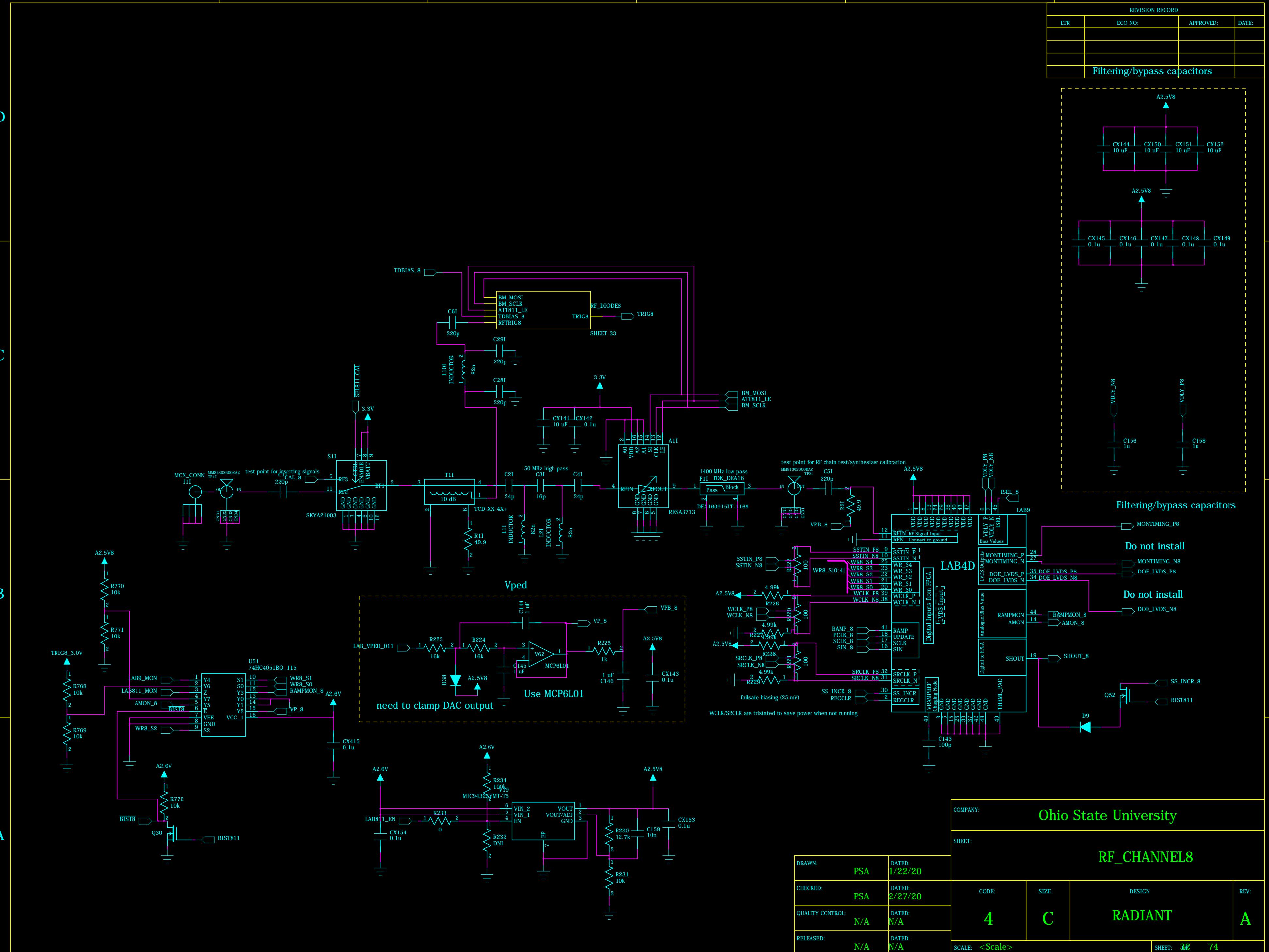
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## REVISION RECORD

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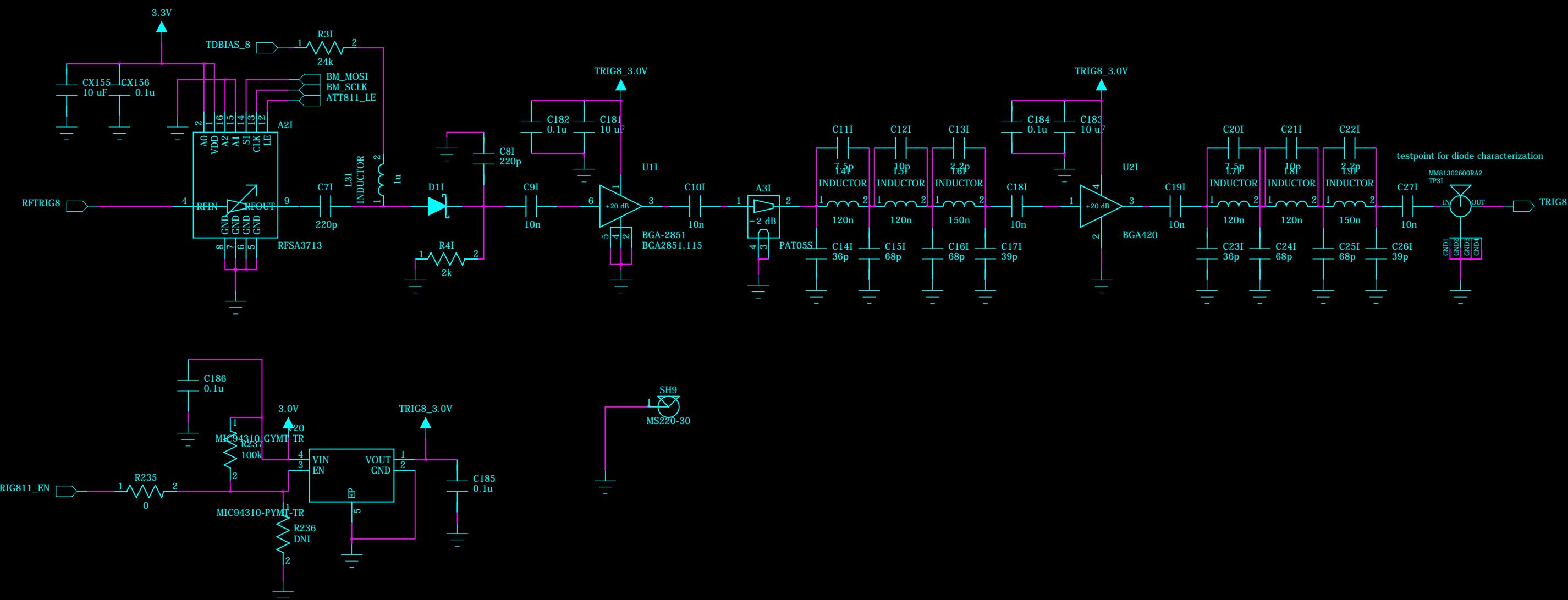
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COMPANY:

Ohio State University

SHEET:

RF\_DIODE8

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## REVISION RECORD

LTR	ECO NO:	APPROVED:	DATE:

Filtering/bypass capacitors

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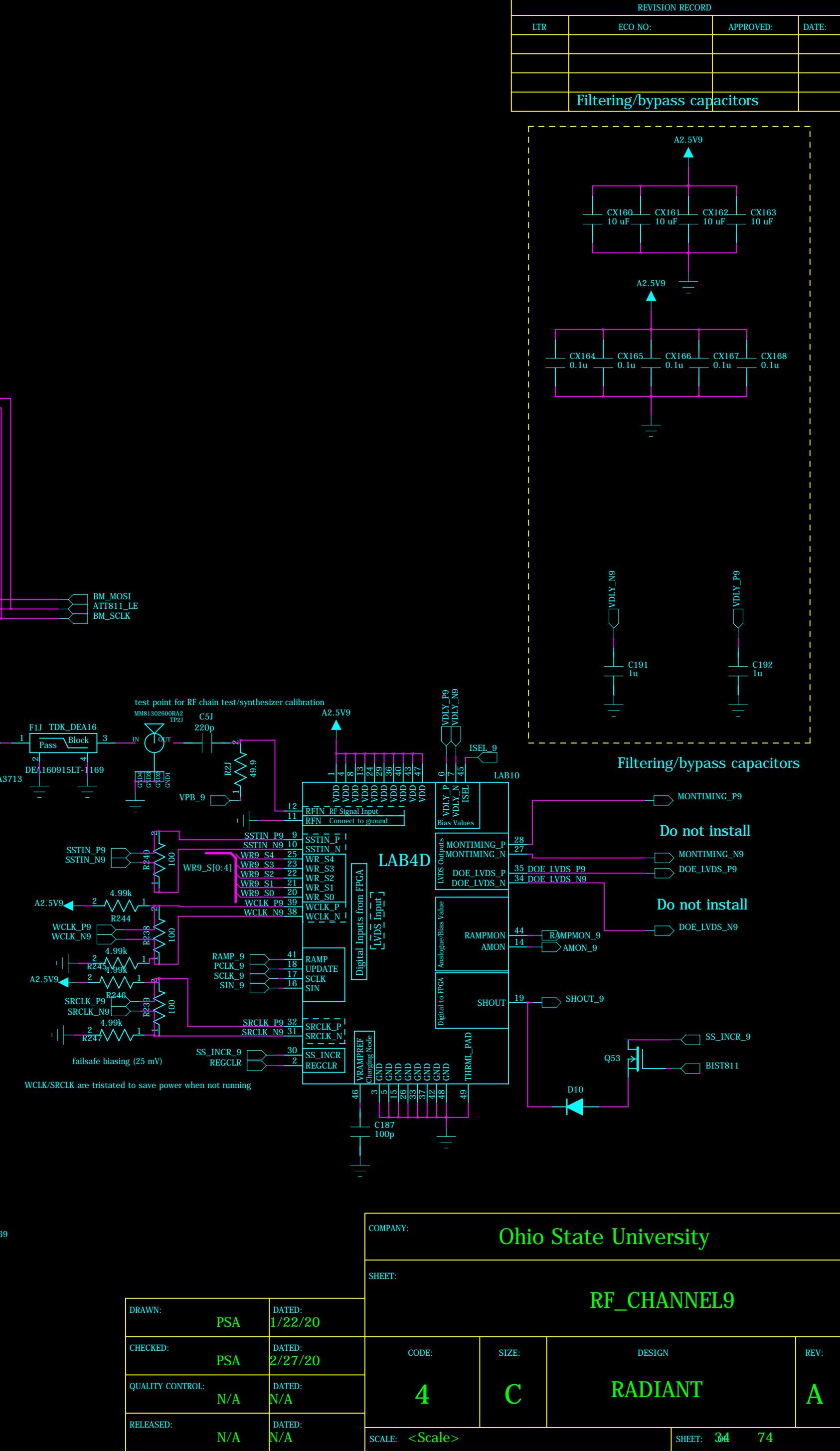
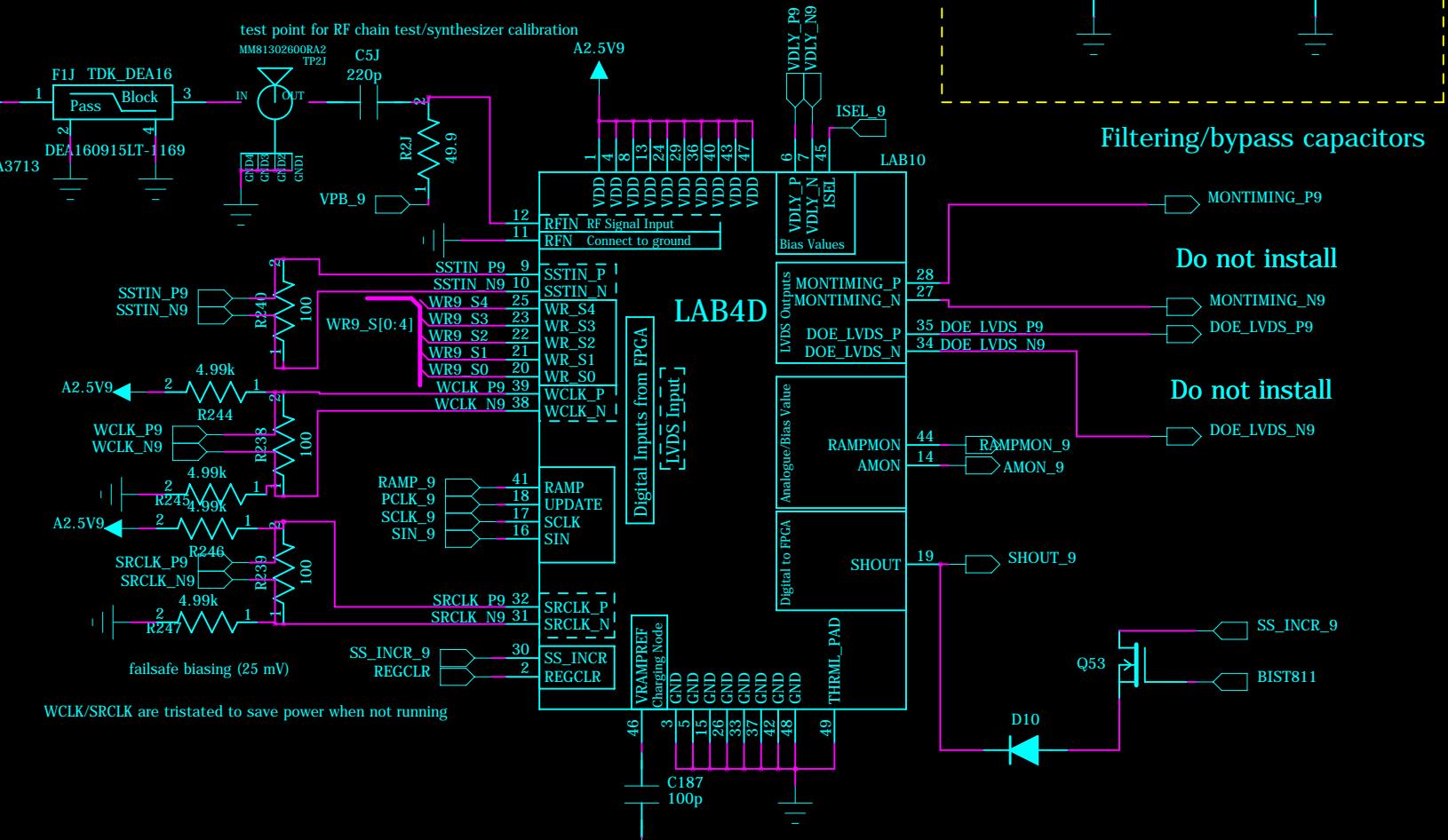
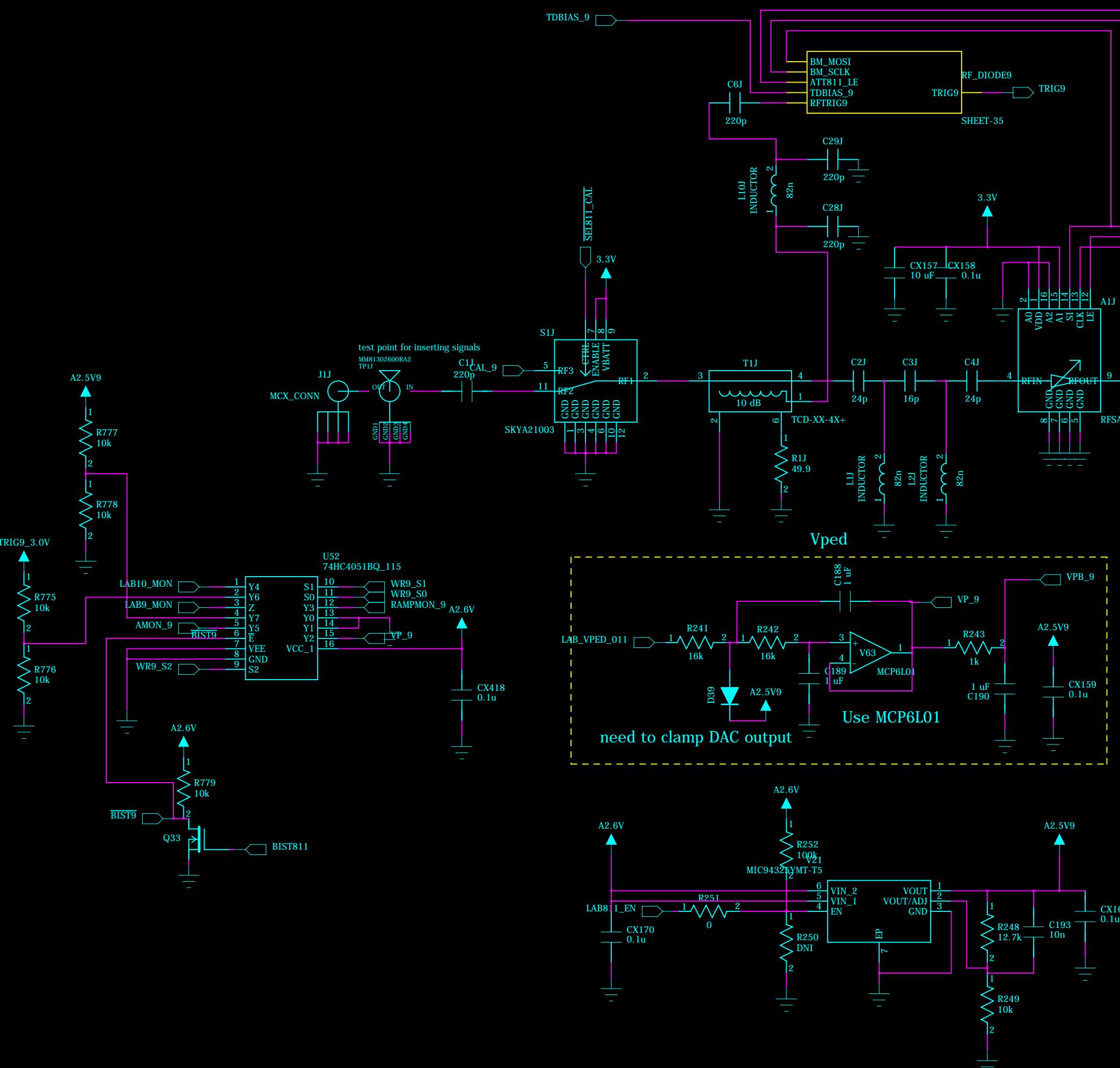
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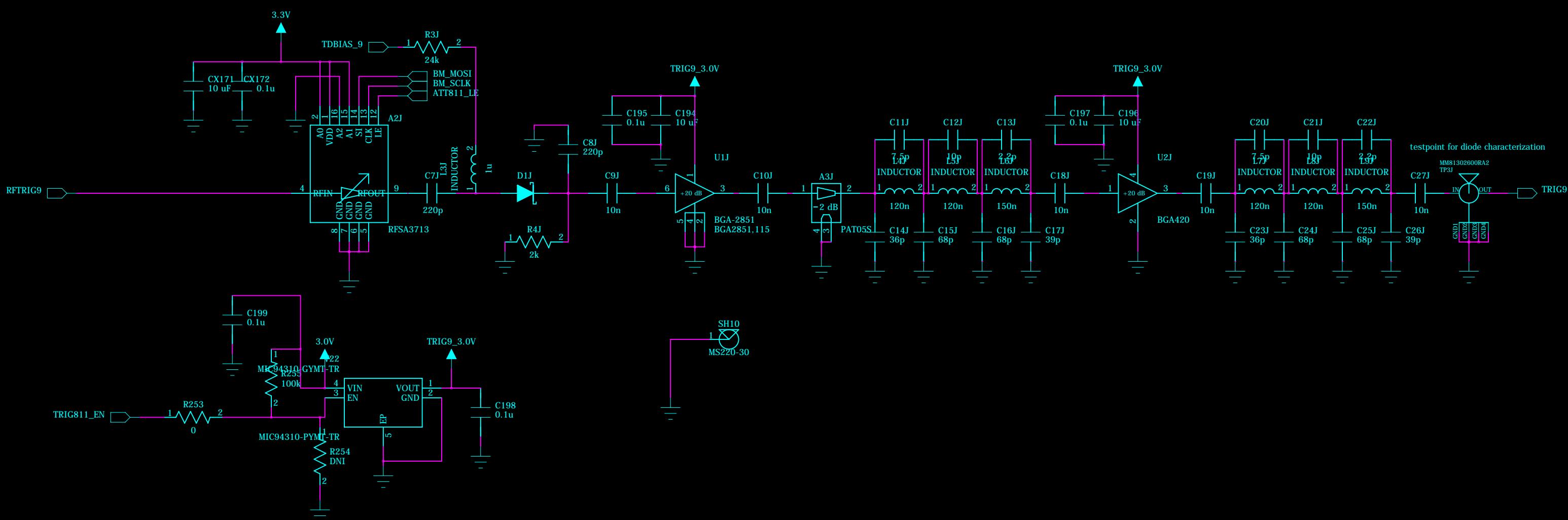
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COMPANY:	Ohio State University		
SHEET:	RF_DIODE9		
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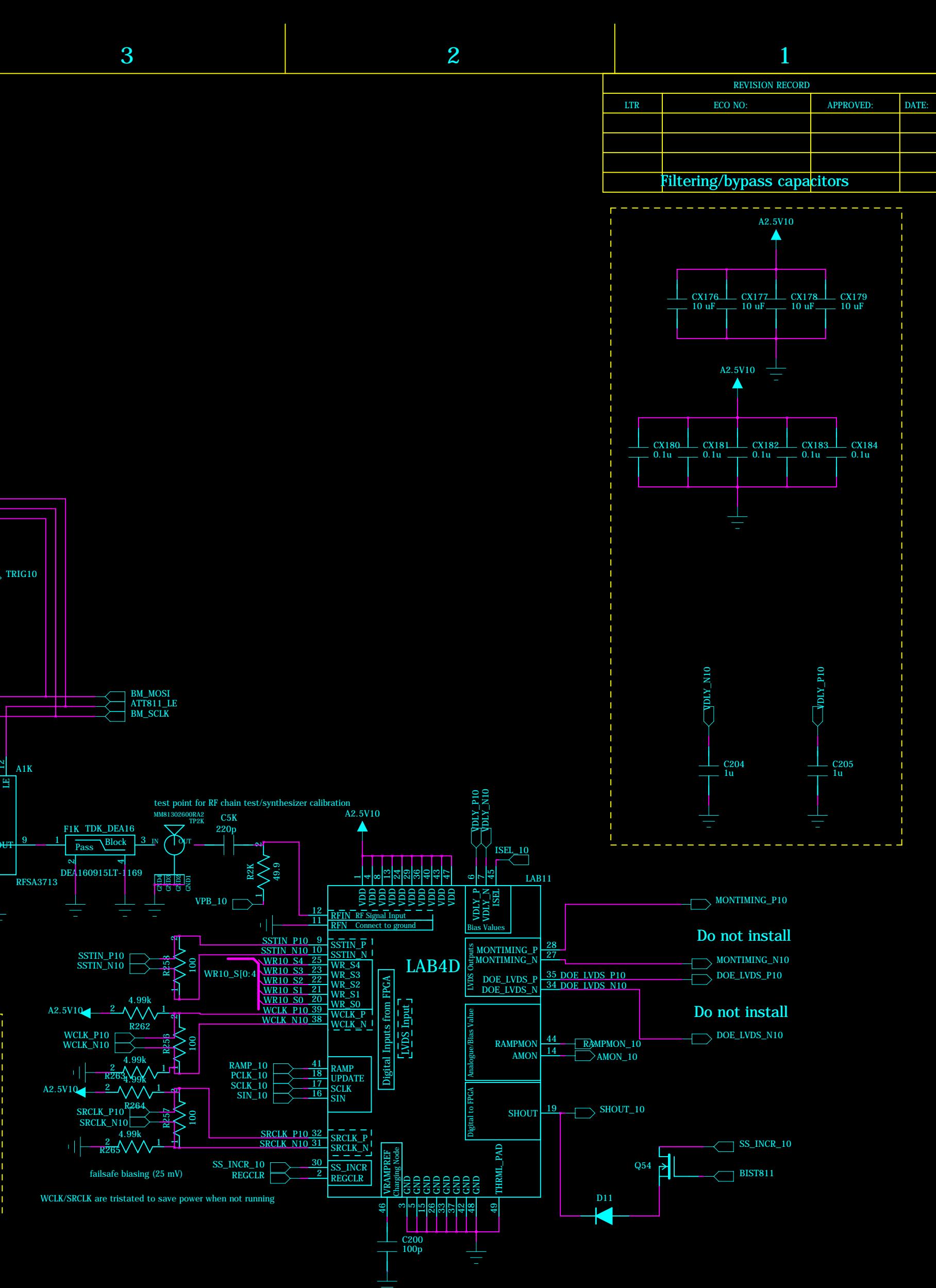
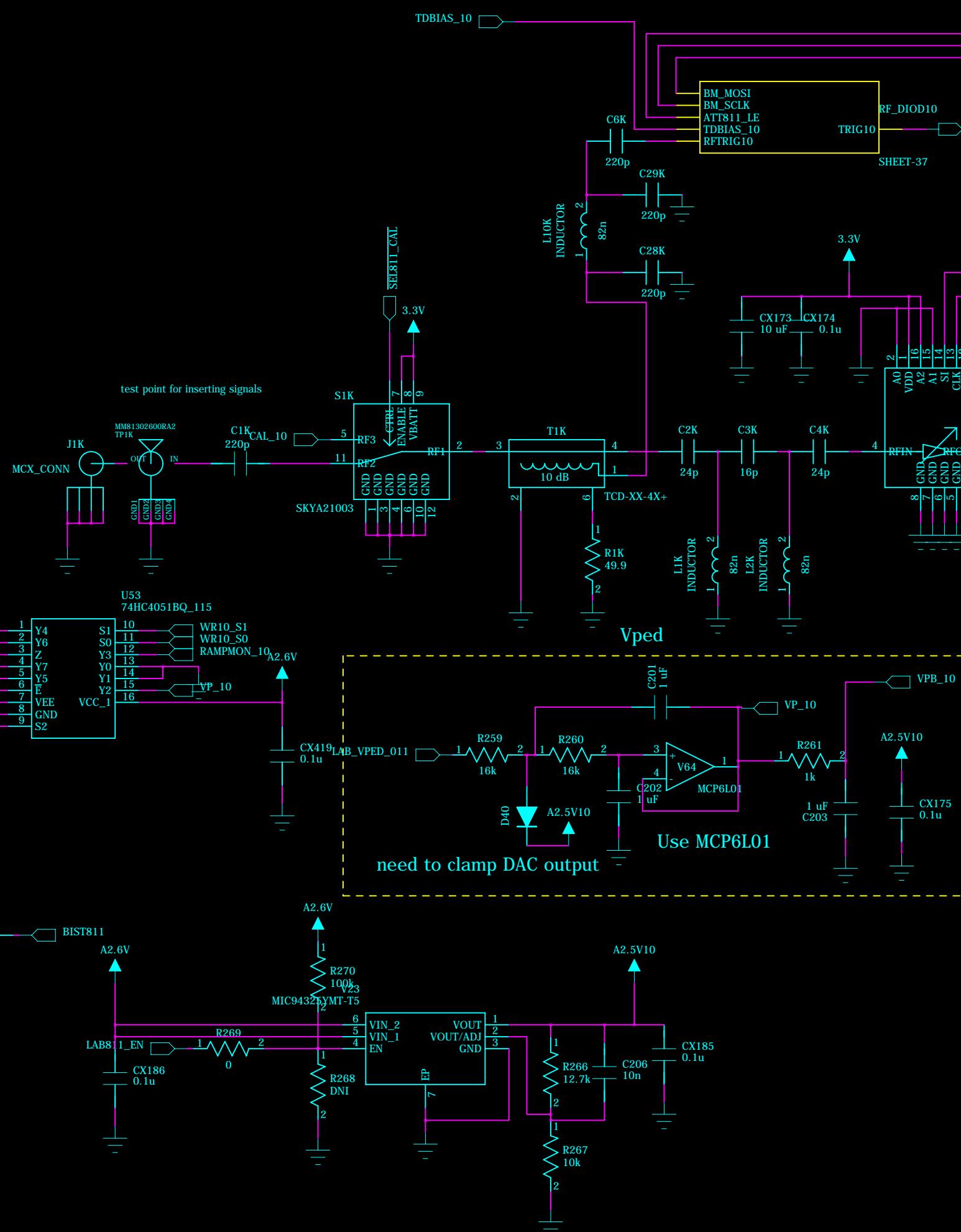
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COMPANY:	Ohio State University		
SHEET:	RF_CHANNEL10		
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## REVISION RECORD

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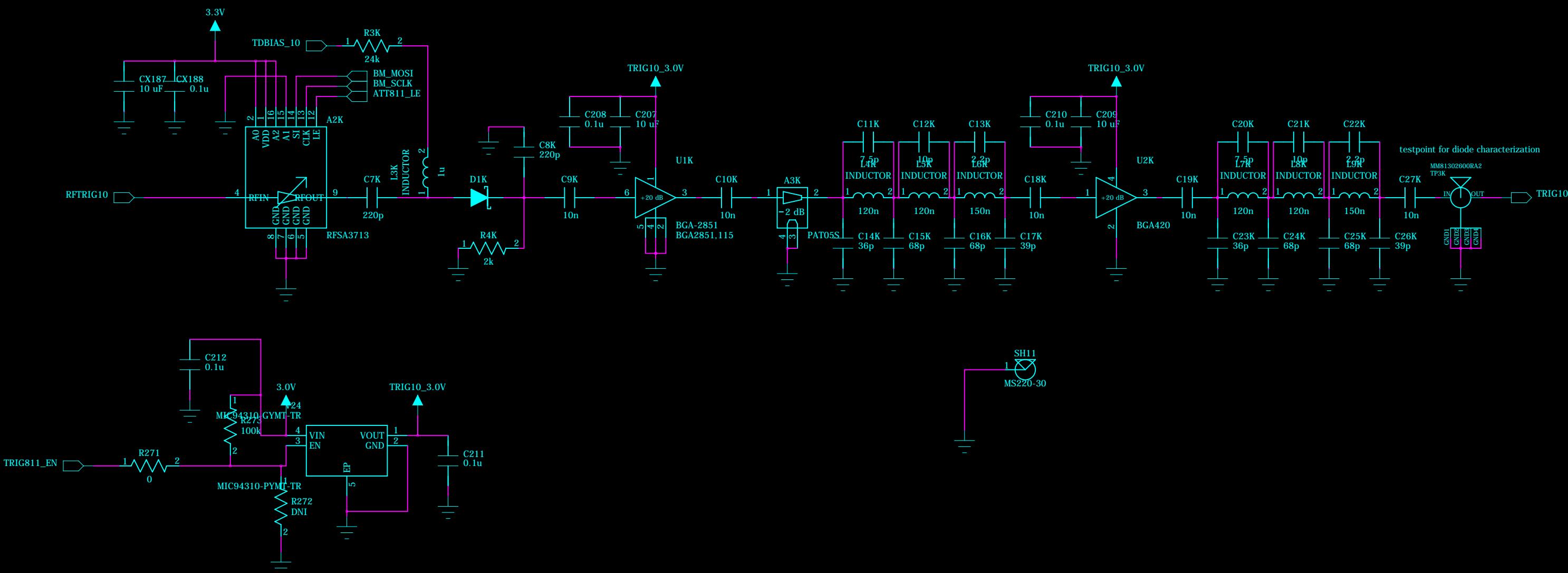
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COMPANY:

Ohio State University

SHEET:

RF\_DIOD10

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## REVISION RECORD

LTR	ECO NO:	APPROVED:	DATE:

Filtering/bypass capacitors

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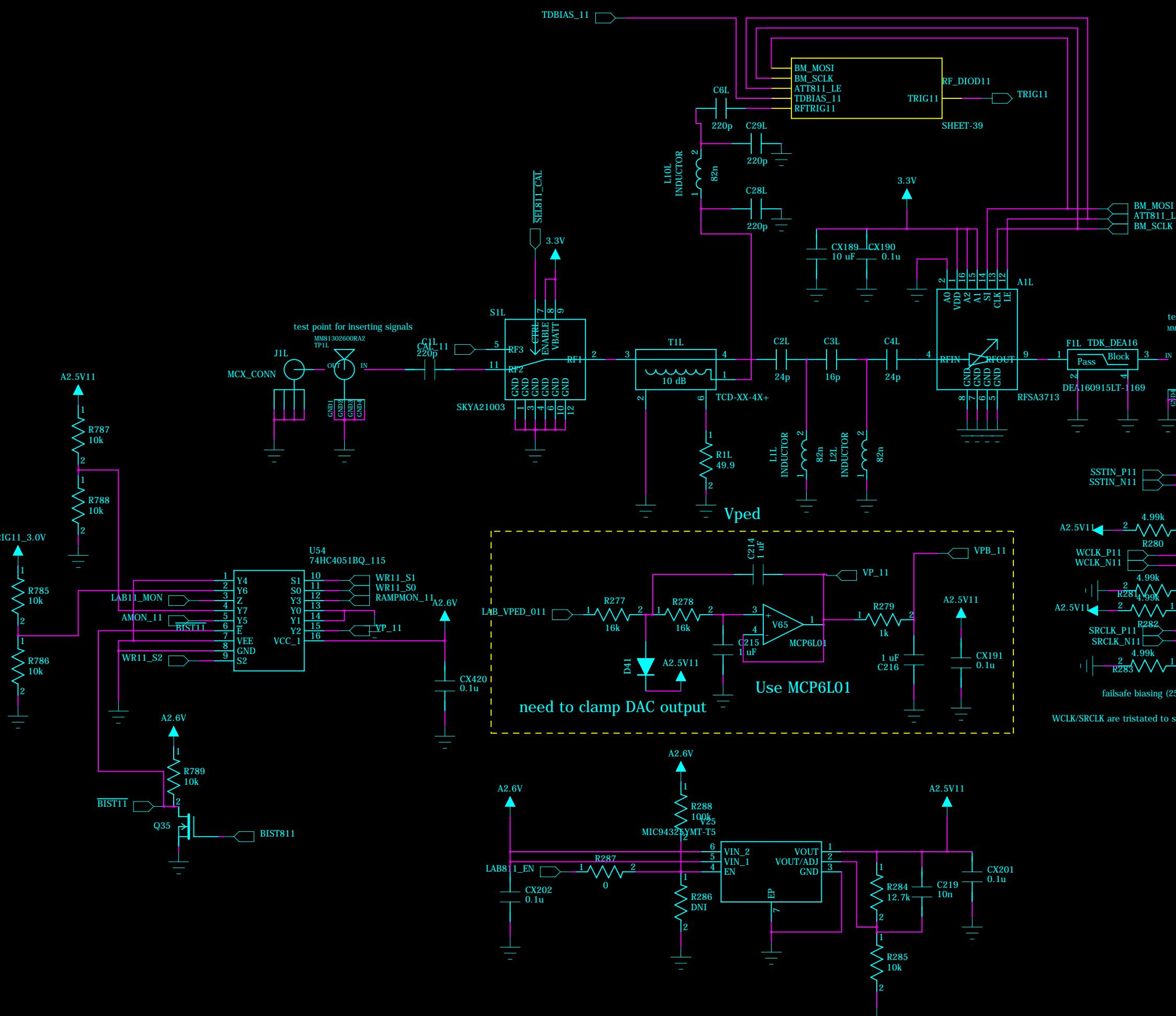
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Ohio State University

RF\_CHANNEL11

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REVISION RECORD

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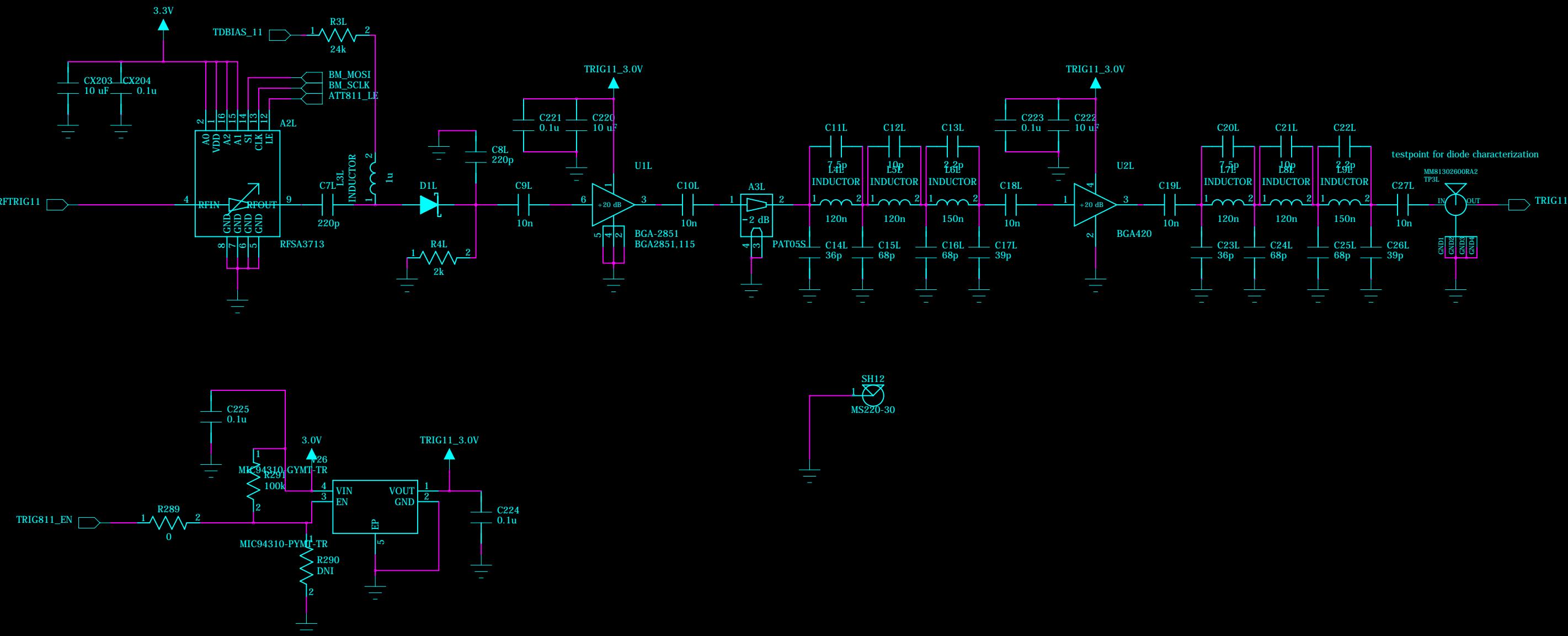
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COMPANY:	Ohio State University		
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REVISION RECORD

LTR	ECO NO:	APPROVED:	DATE:

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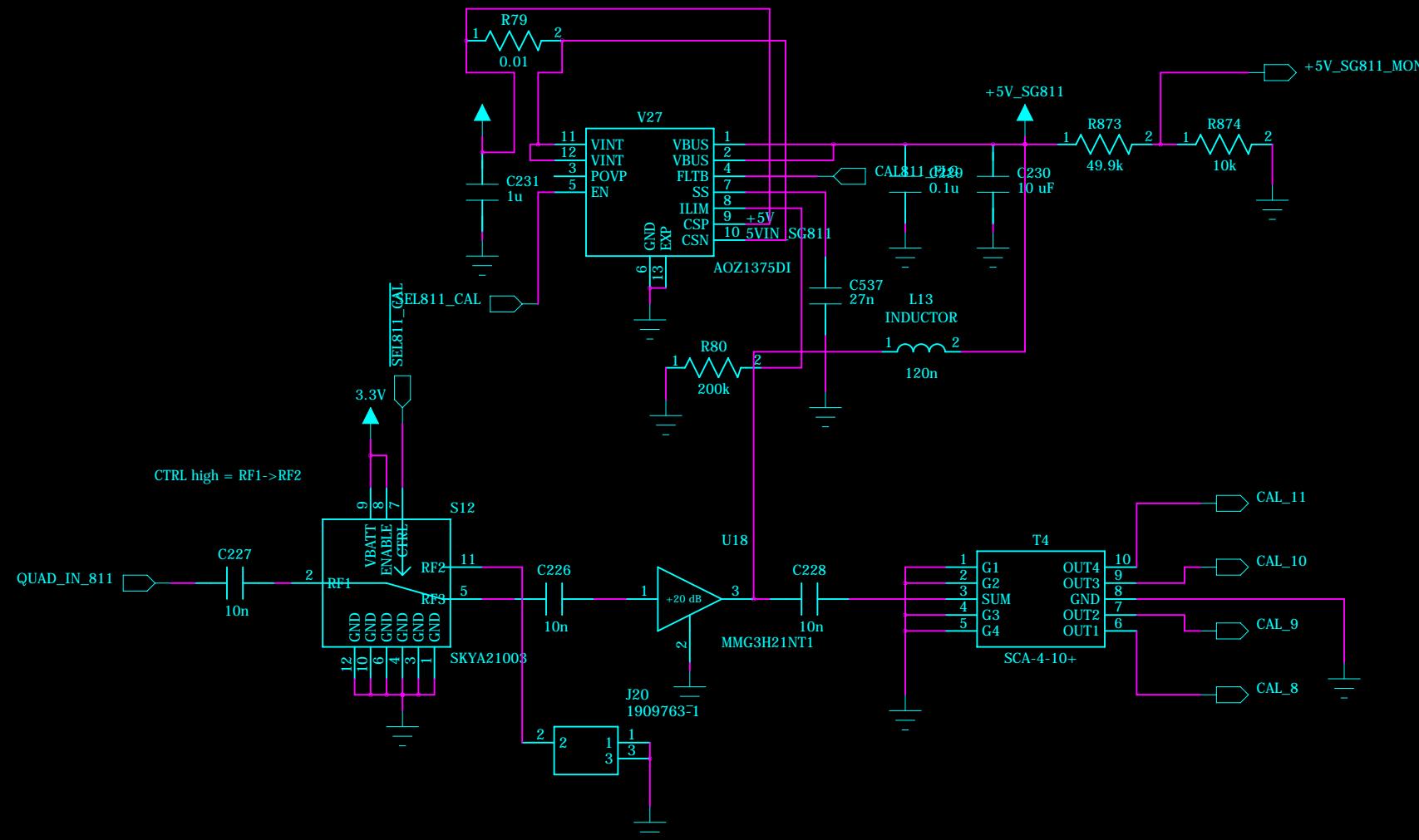
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COMPANY:	Ohio State University		
SHEET:	QUAD_SIG_GENERATOR		
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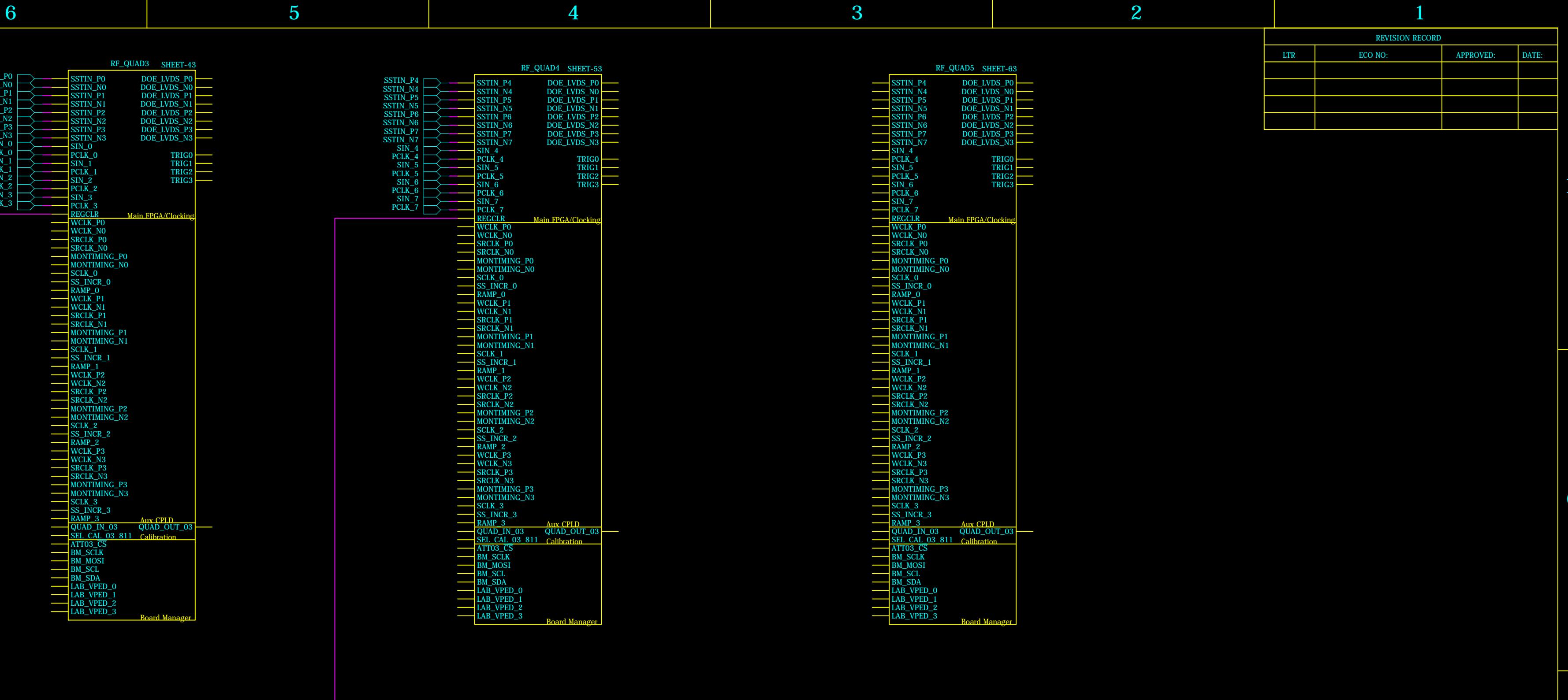
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there's stuff here, it's just off-sheet cuz it's too big

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RELEASED:	N/A	DATED: N/A	RADIANT	A
			REV:	
			SCALE: <Scale>	Sheet: 41 74



COMPANY:	Ohio State University		
SHEET:	RF_LEFT0		
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QUALITY CONTROL:	N/A	DATED:	N/A
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## REVISION RECORD

LTR	ECO NO:	APPROVED:	DATE:

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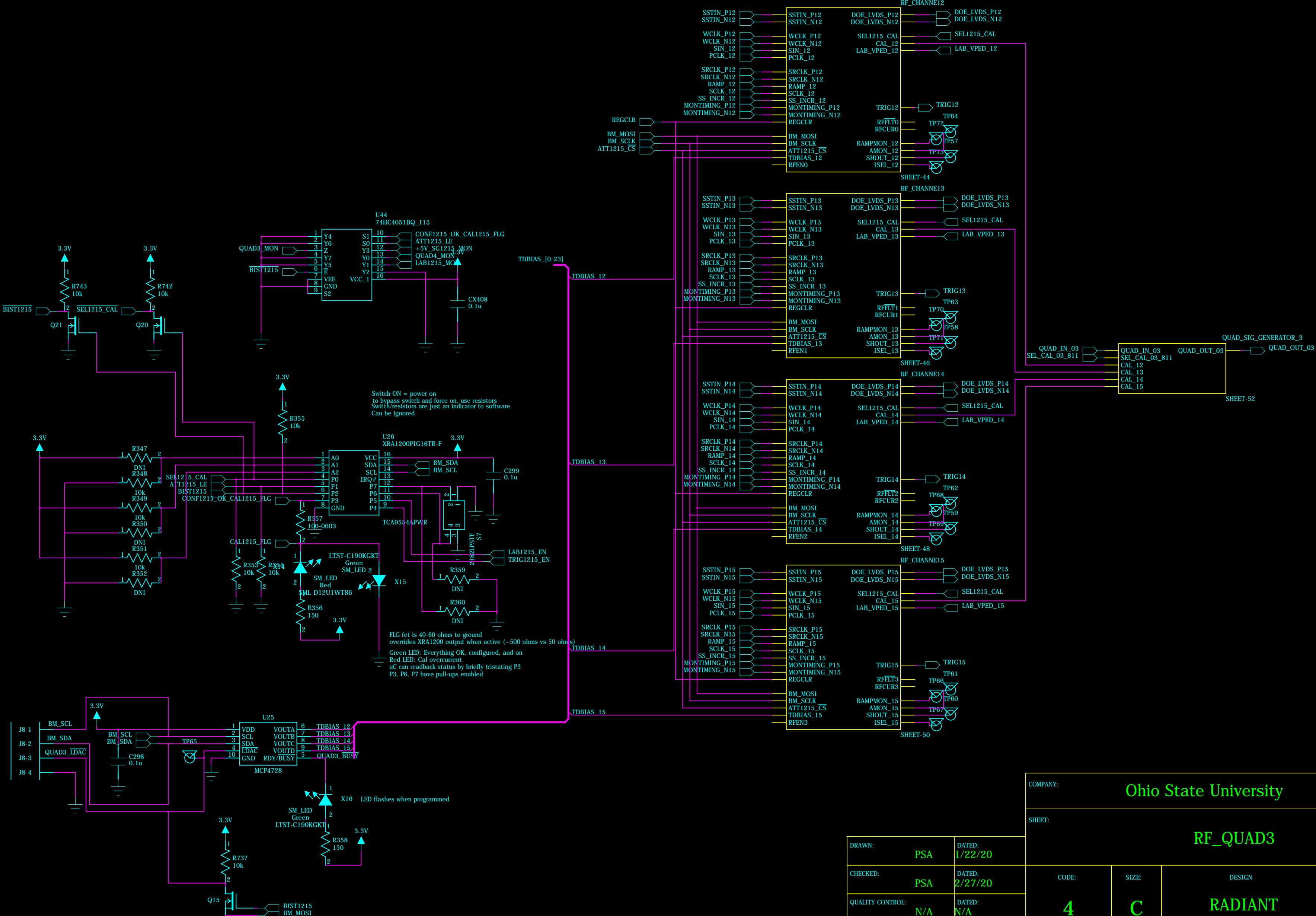
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Ohio State University

RF\_QUAD3

COMPANY:	Ohio State University		
SHEET:	RF_QUAD3		
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CHECKED:	PSA	DATED:	2/27/20
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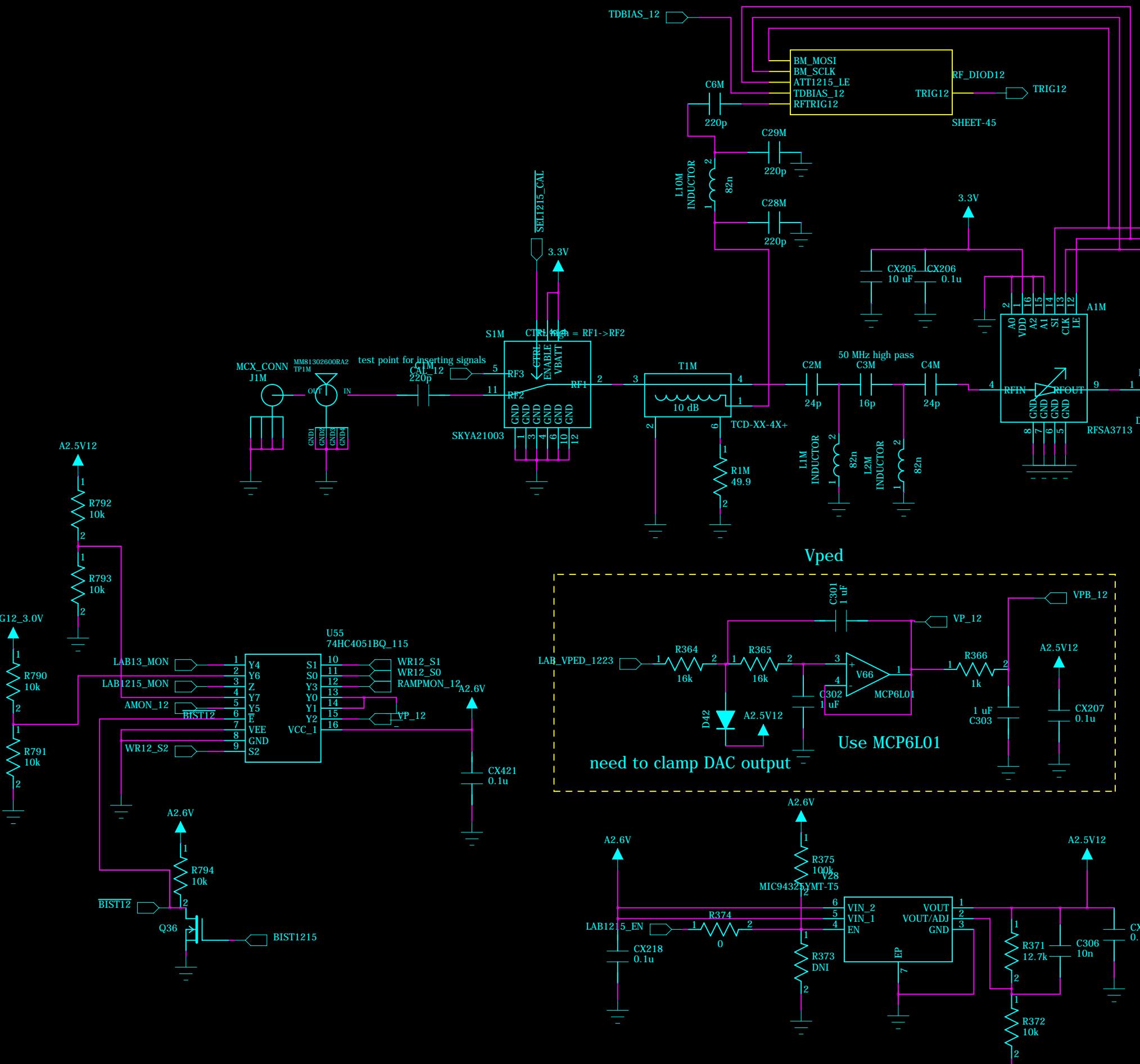
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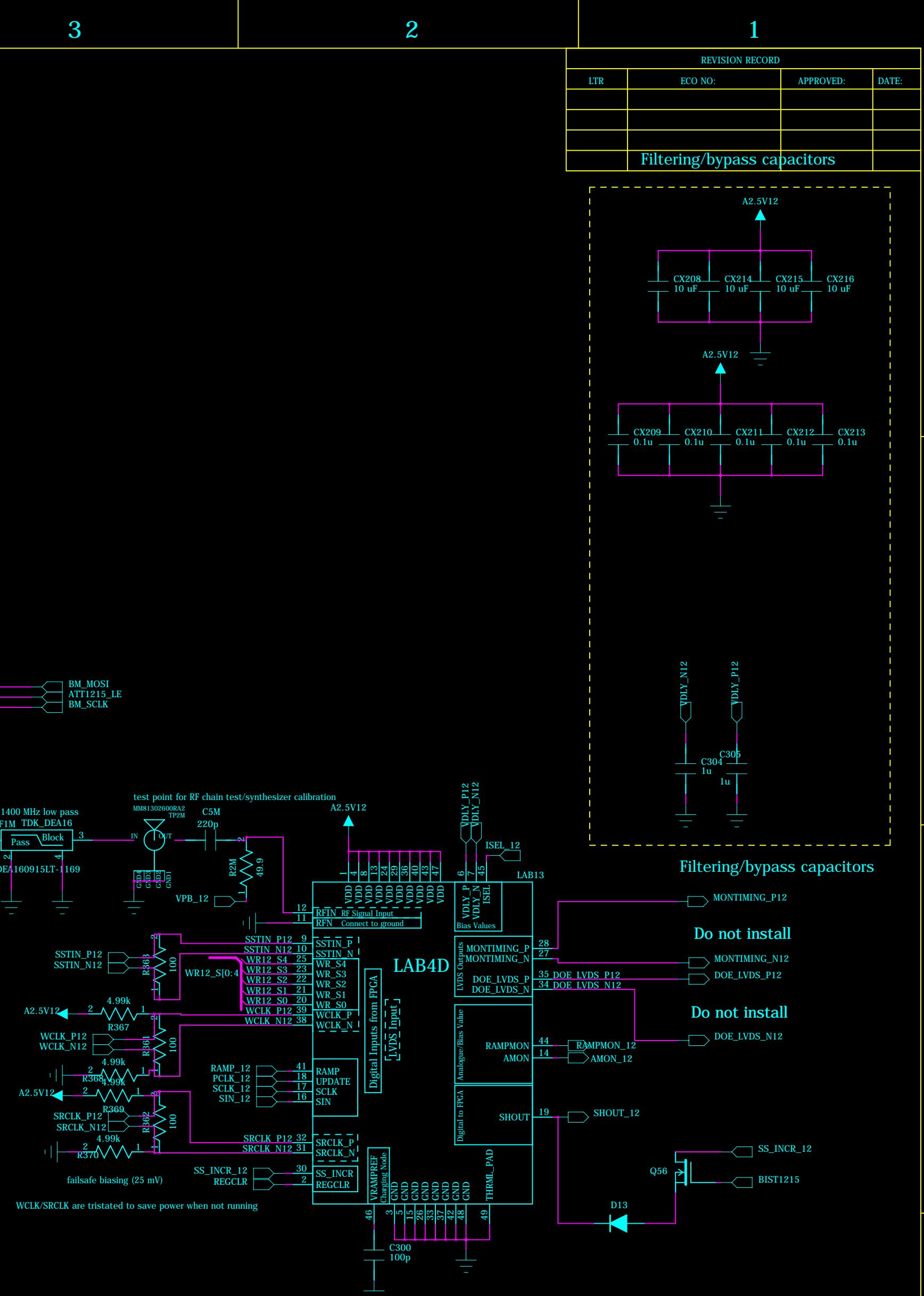
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REVISION RECORD			
LTR	ECO NO:	APPROVED:	DATE:
Filtering/bypass capacitors			
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CX215	10 uF	CX216	10 uF
CX209	0.1u	CX210	0.1u
CX211	0.1u	CX212	0.1u
CX213	0.1u		



Ohio State University

RF\_CHANNEL12

COMPANY:			
SHEET:			
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SCALE: &lt;Scale&gt; SHEET: 44 74

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## REVISION RECORD

LTR	ECO NO:	APPROVED:	DATE:

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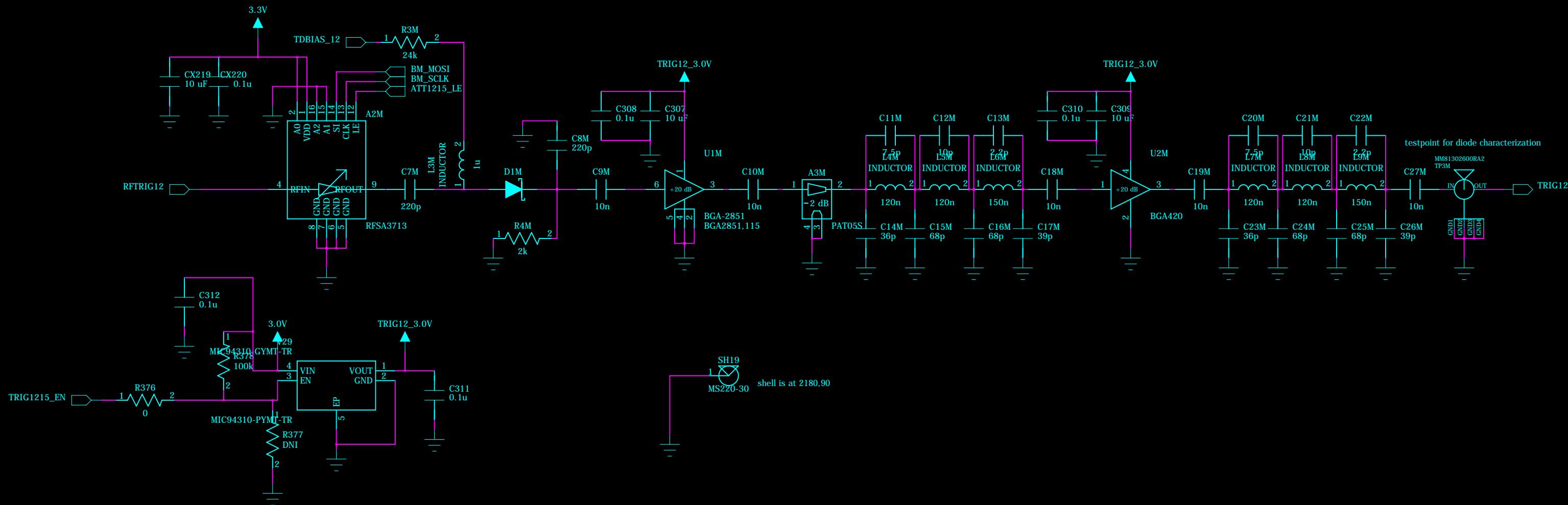
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COMPANY:

Ohio State University

SHEET:

RF\_DIOD12

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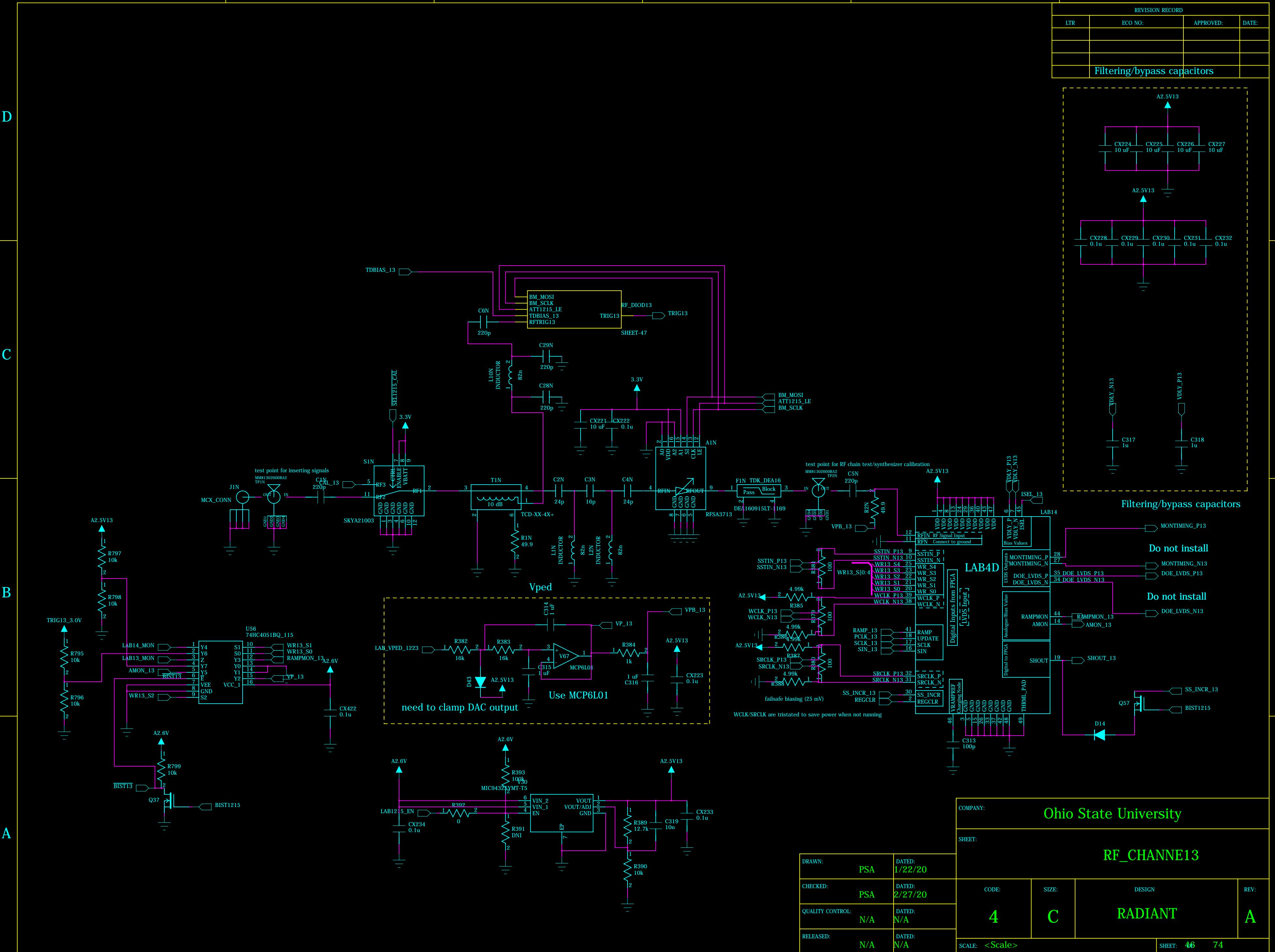
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## REVISION RECORD

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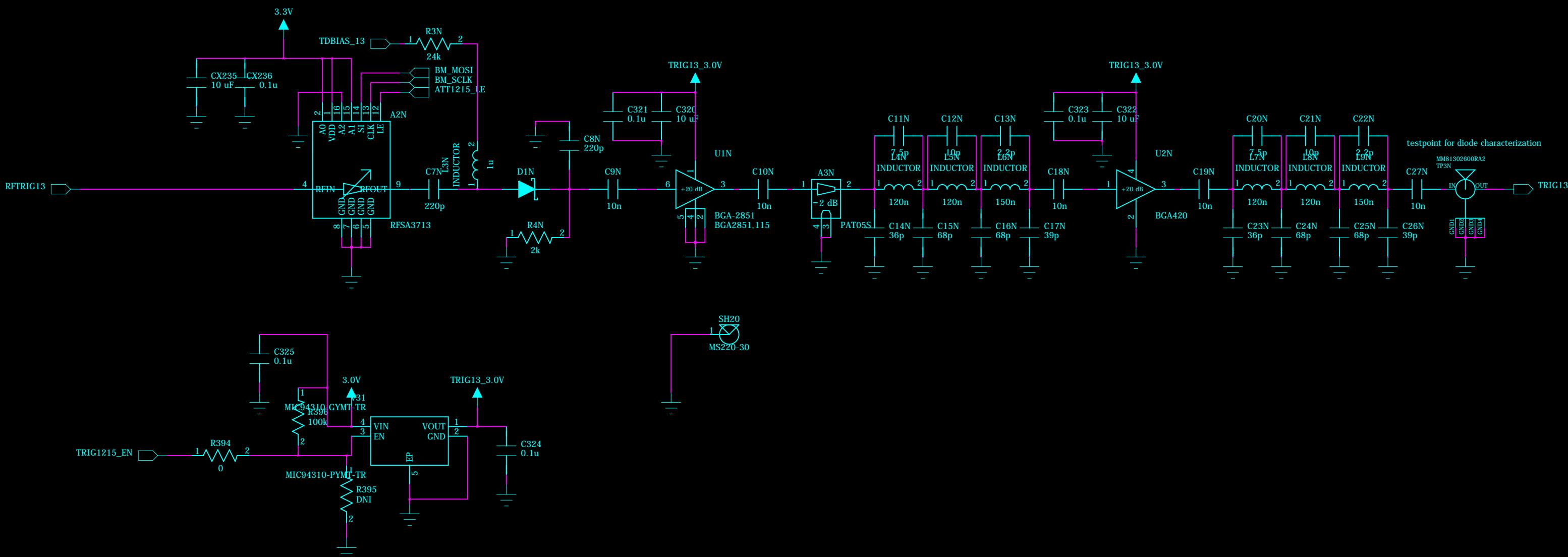
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COMPANY:	Ohio State University		
SHEET:	RF_DIOD13		
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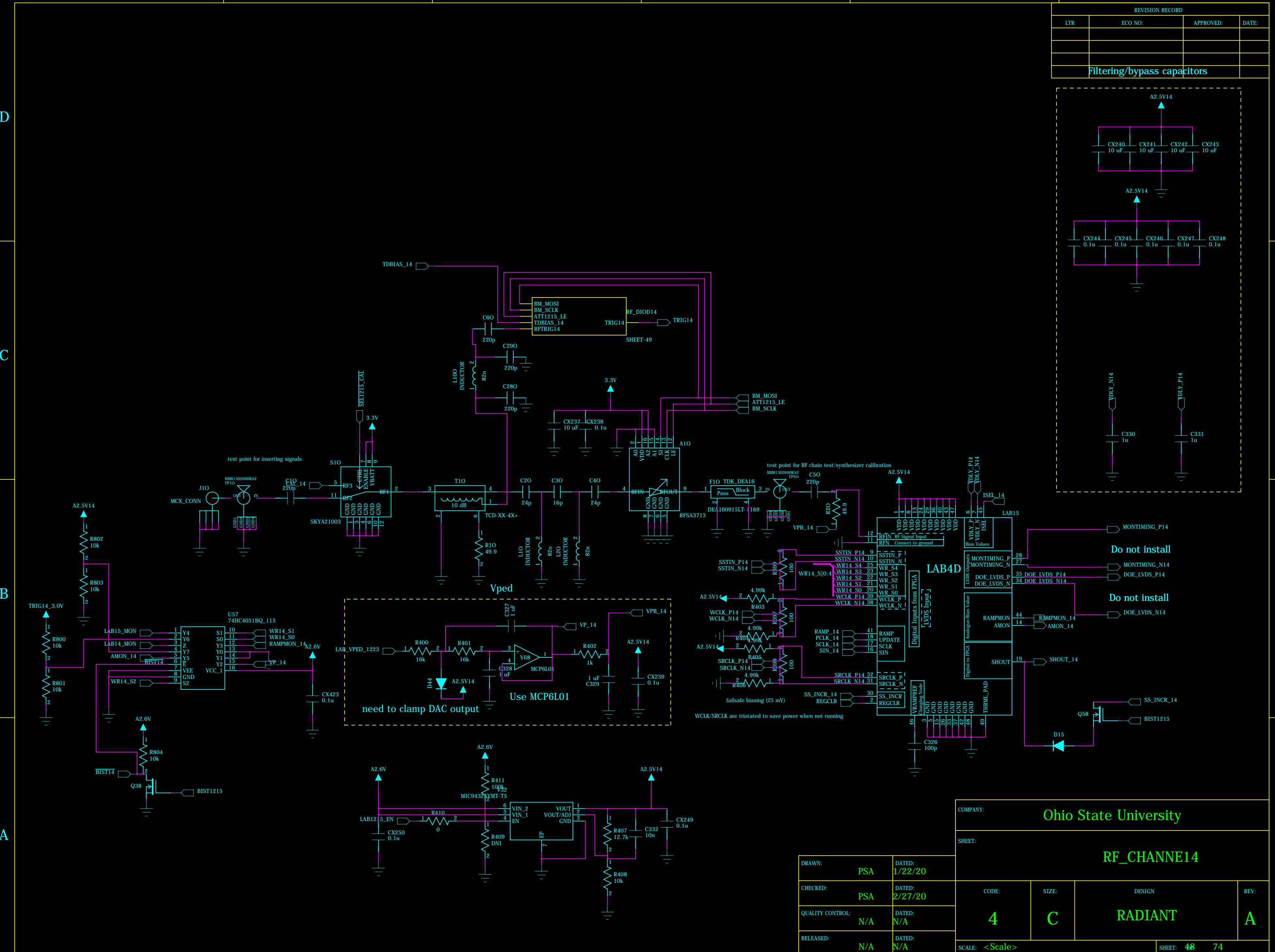
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## REVISION RECORD

LTR	ECO NO:	APPROVED:	DATE:

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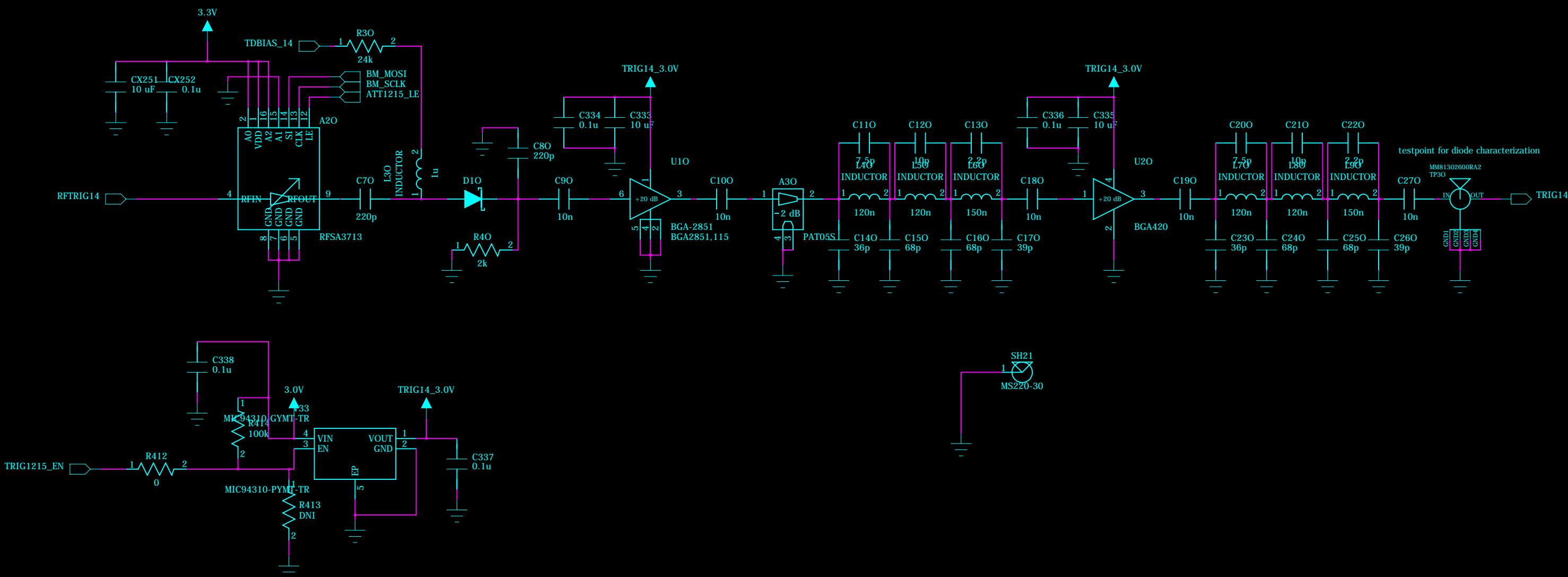
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COMPANY:

Ohio State University

SHEET:

RF\_DIOD14

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SCALE: &lt;Scale&gt; SHEET: 49 74

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## REVISION RECORD

LTR	ECO NO:	APPROVED:	DATE:

Filtering/bypass capacitors

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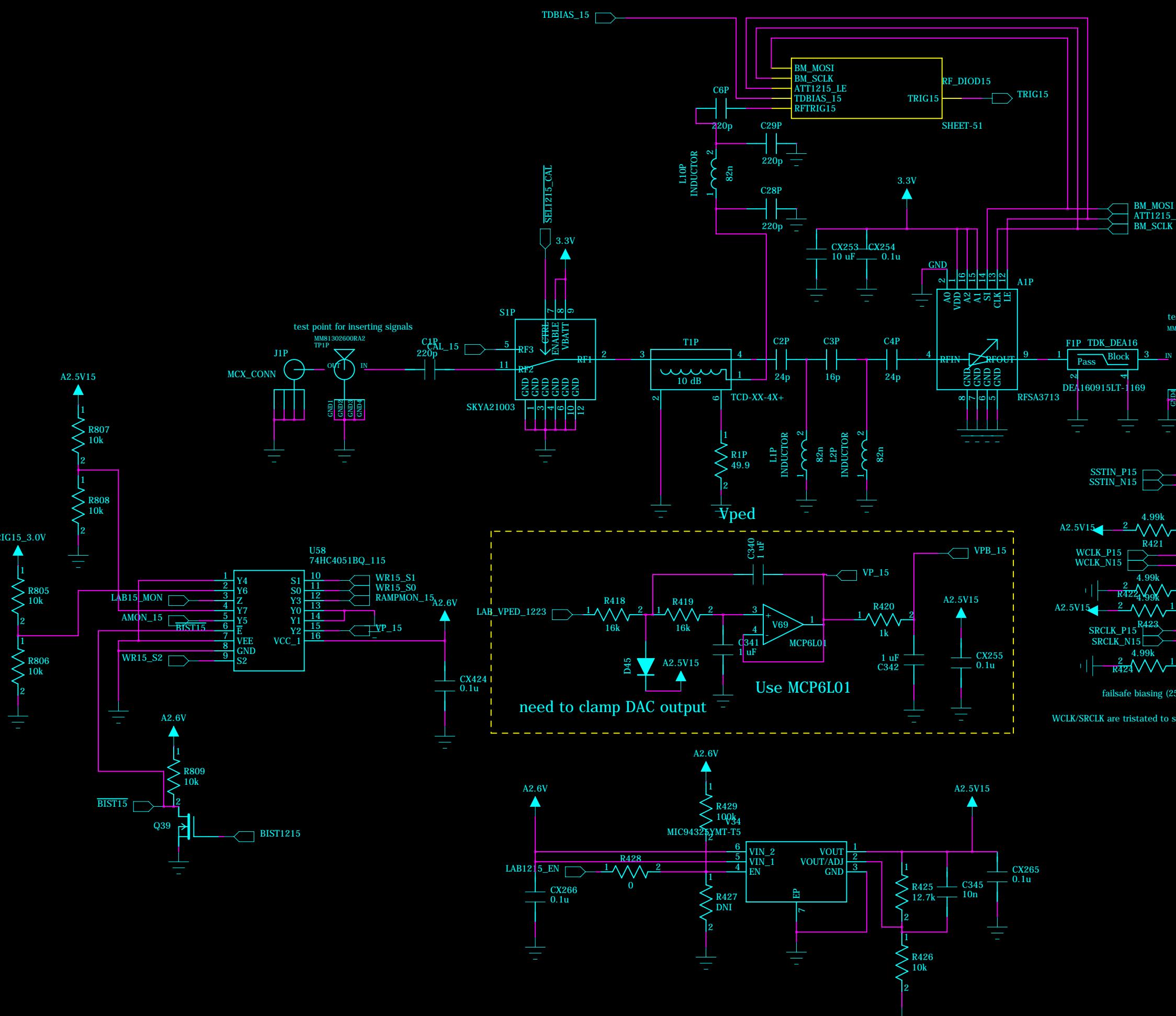
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DRAWN:	PSA	DATED:	1/22/20
CHECKED:	PSA	DATED:	2/27/20
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RELEASED:	N/A	DATED:	N/A

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Ohio State University

RF\_CHANNEL15

COMPANY: SHEET:

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## REVISION RECORD

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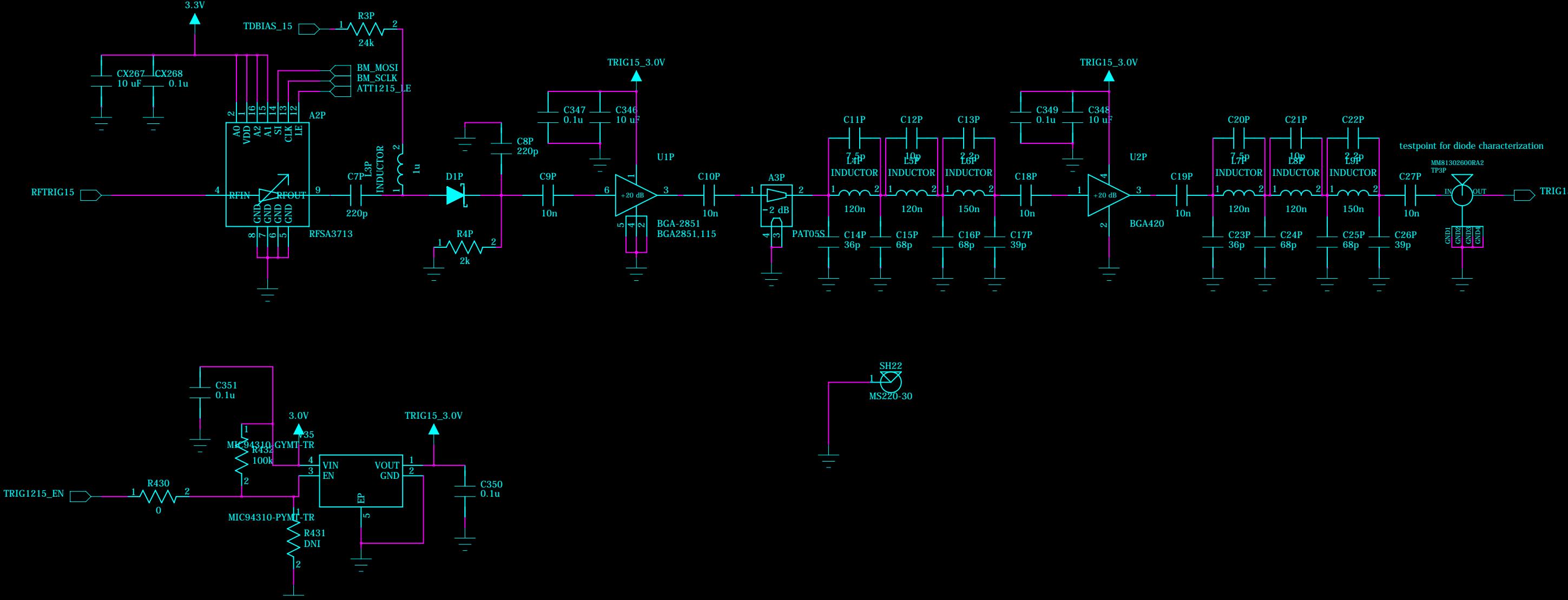
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COMPANY:	Ohio State University		
SHEET:	RF_DIOD15		
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REVISION RECORD			
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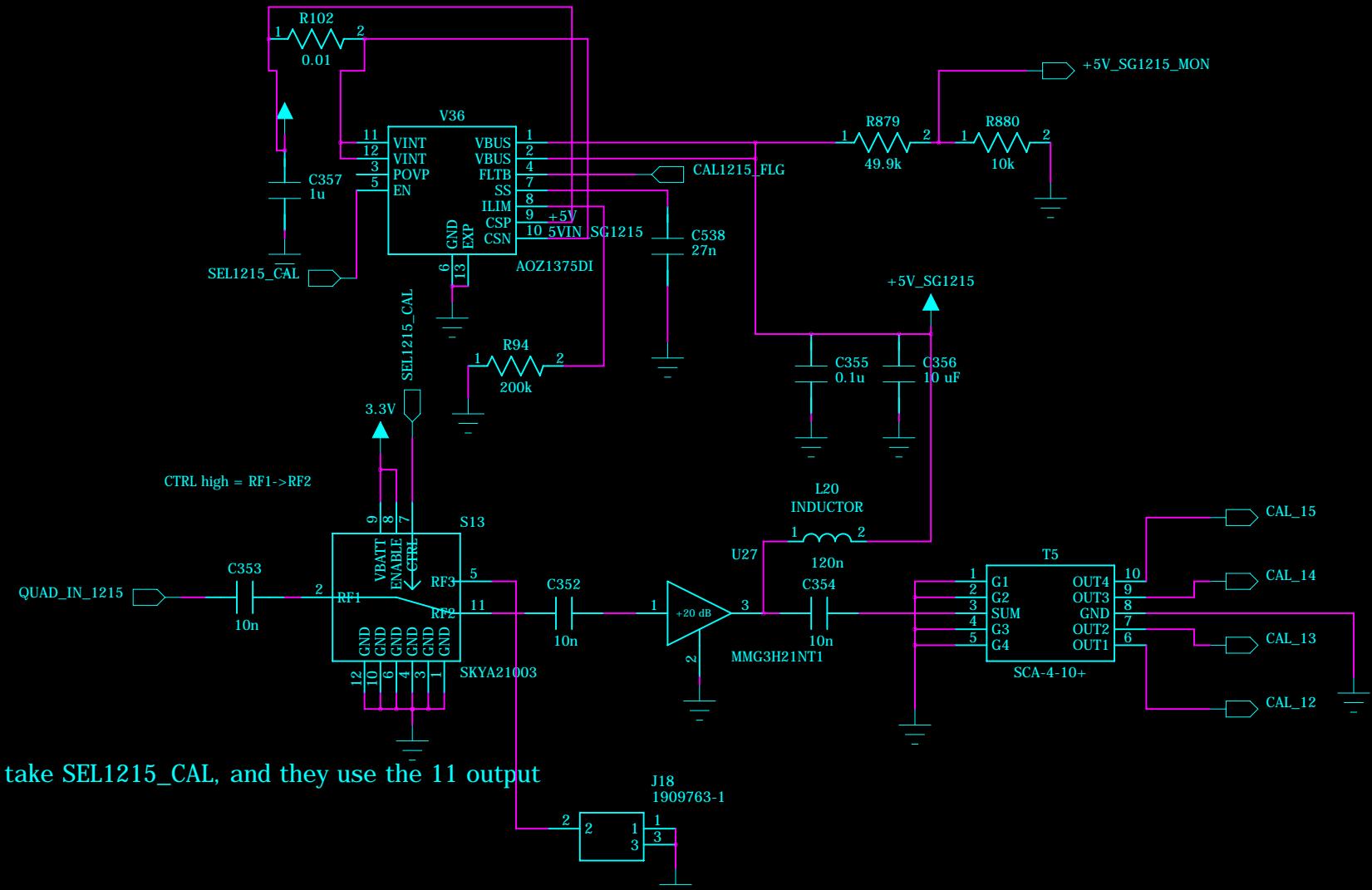
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COMPANY:	Ohio State University		
SHEET:	QUAD_SIG_GENERATOR 3		
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## REVISION RECORD

LTR	ECO NO:	APPROVED:	DATE:

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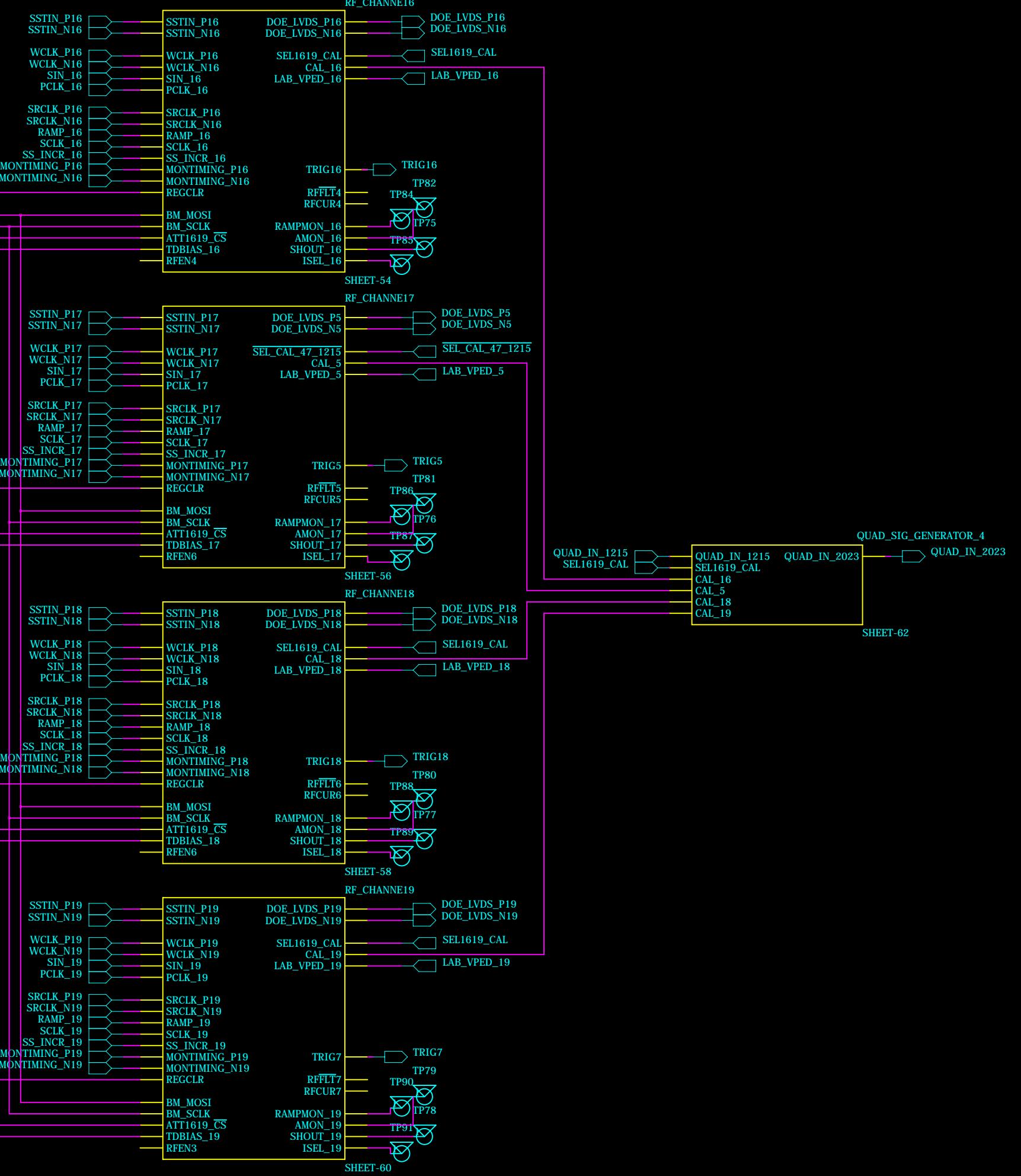
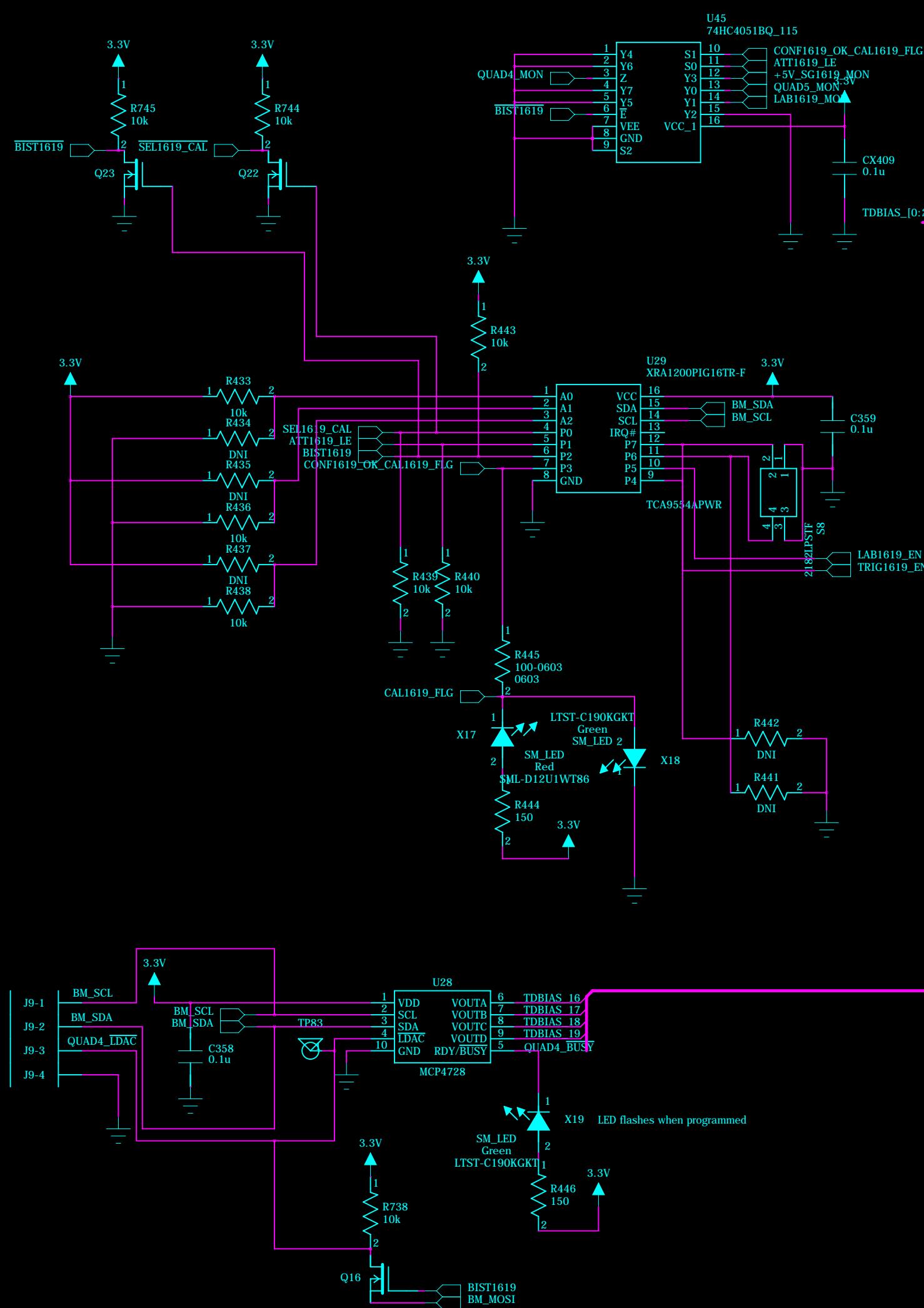
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COMPANY:	Ohio State University		
SHEET:	RF_QUAD4		
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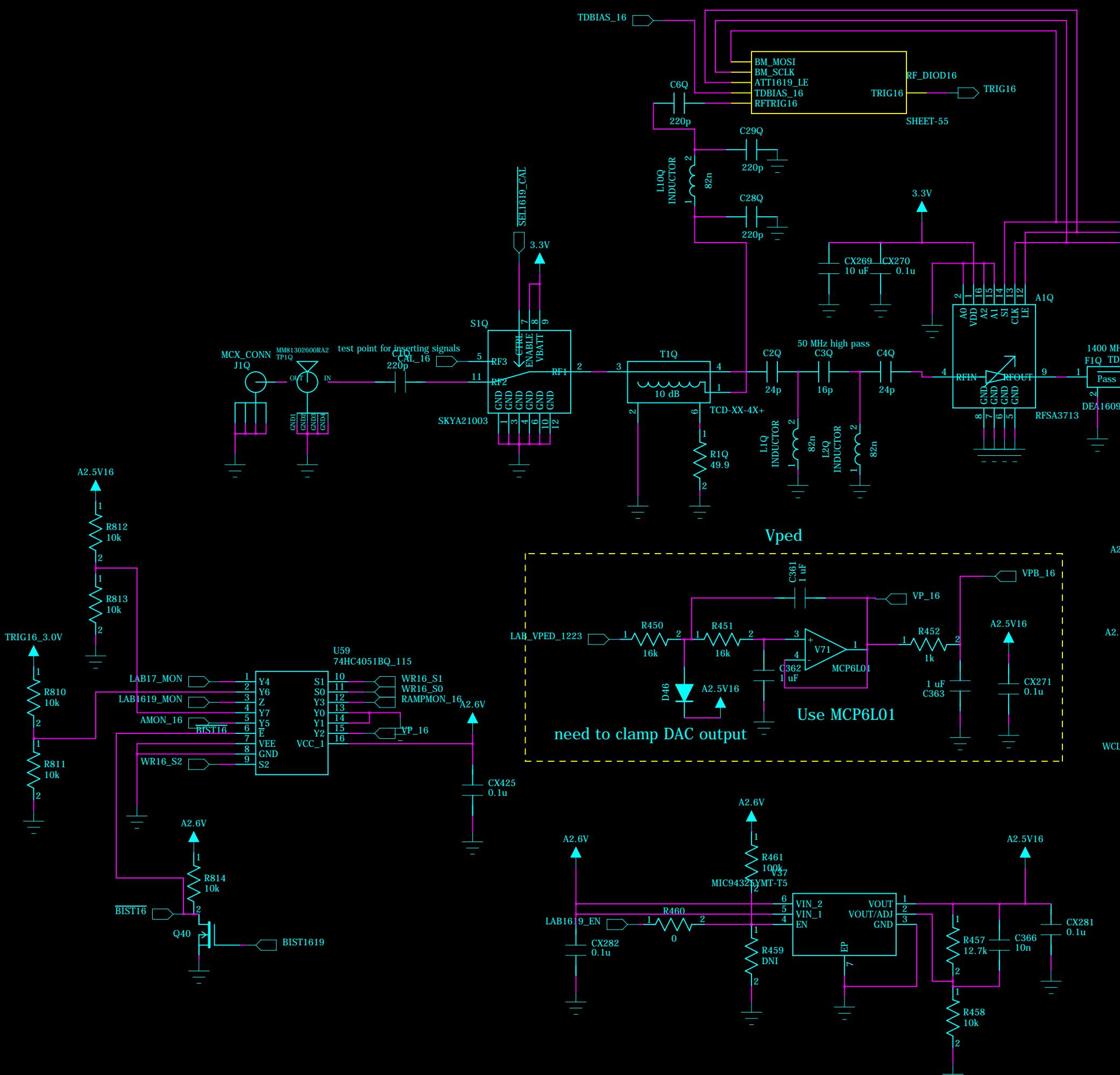
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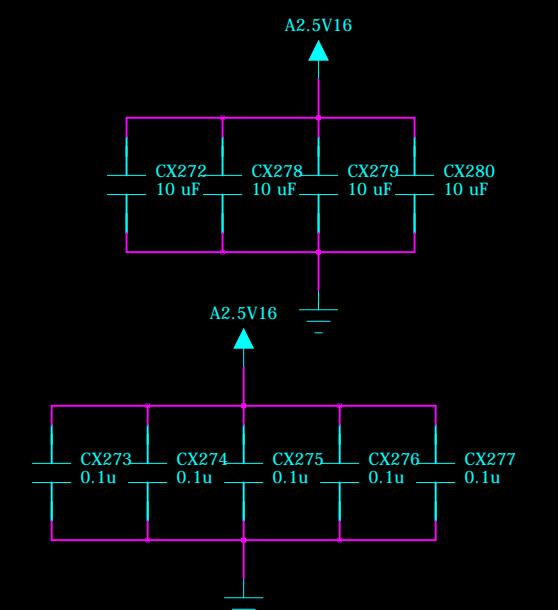
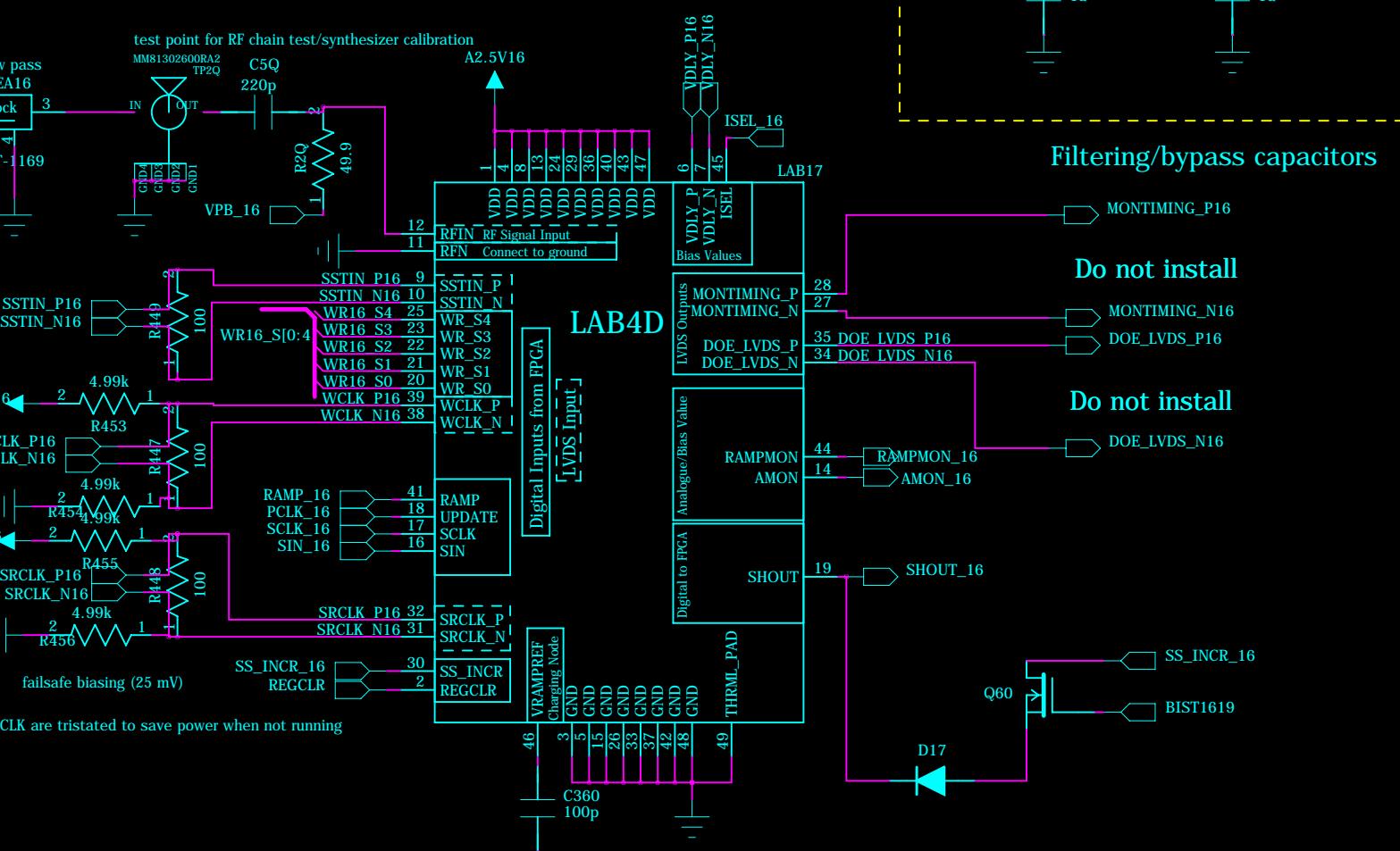
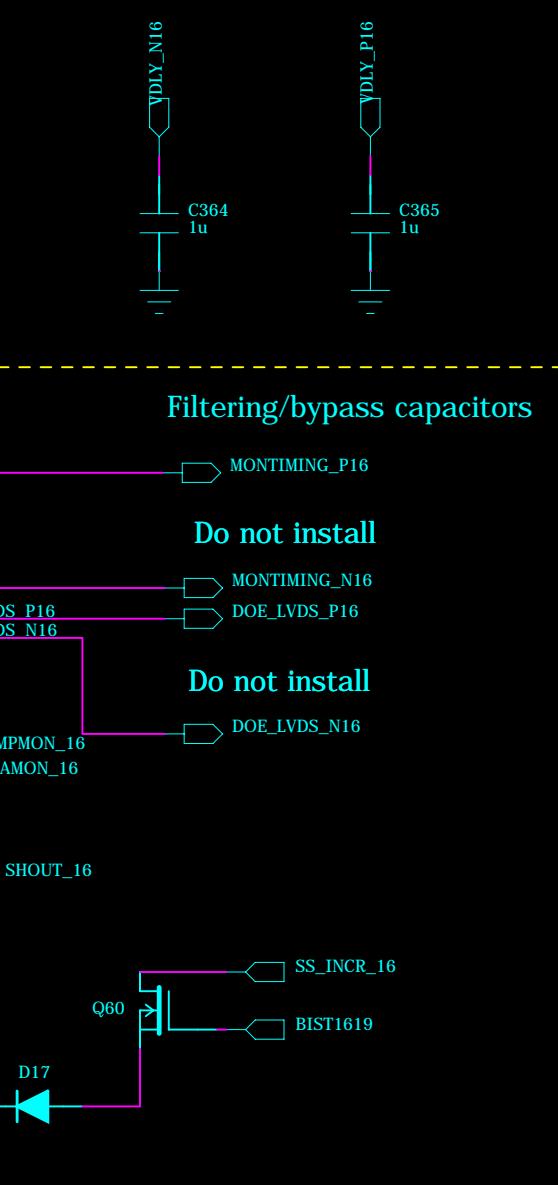
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LTR	ECO NO:	APPROVED:	DATE:

Filtering/bypass capacitors



Ohio State University			
RF_CHANNEL16			
COMPANY:	SHEET:	DESIGN:	REV:
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## REVISION RECORD

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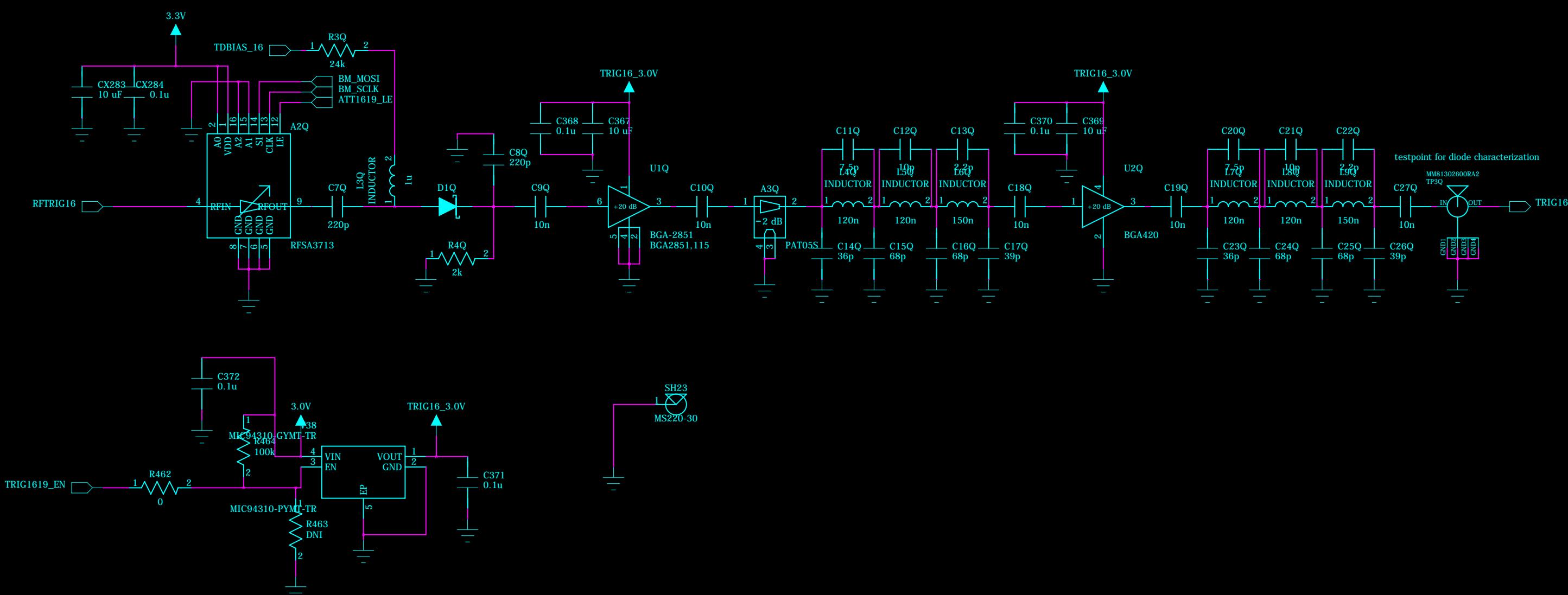
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COMPANY:

Ohio State University

SHEET:

RF\_DIOD16

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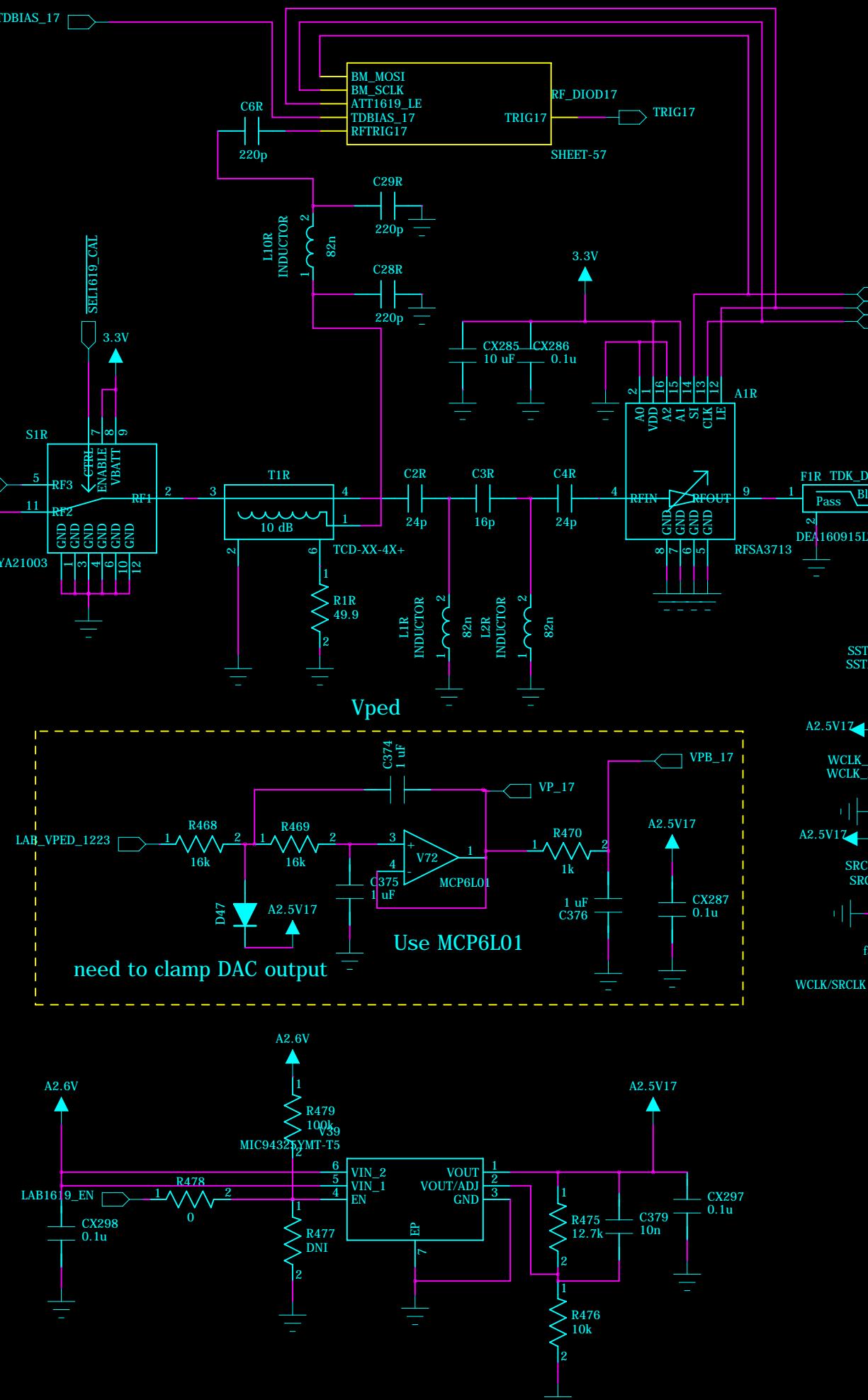
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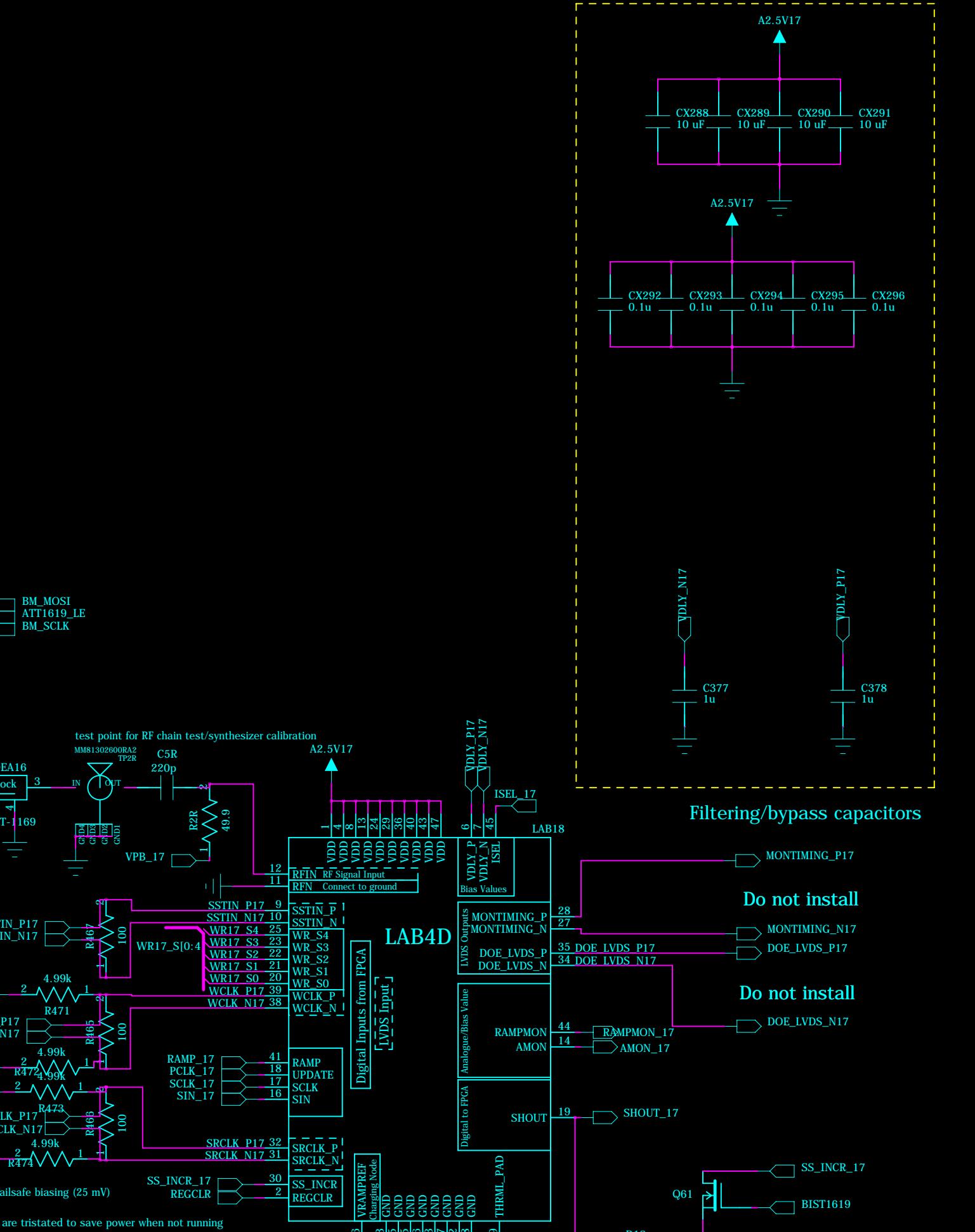


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CHECKED:		PSA	DATED:	2/27/20
QUALITY CONTROL:		N/A	DATED:	N/A
RELEASED:		N/A	DATED:	N/A
SCALE:	<Scale>		SHEET:	56 74

Ohio State University

RF\_CHANNEL17

Filtering/bypass capacitors



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## REVISION RECORD

LTR	ECO NO:	APPROVED:	DATE:

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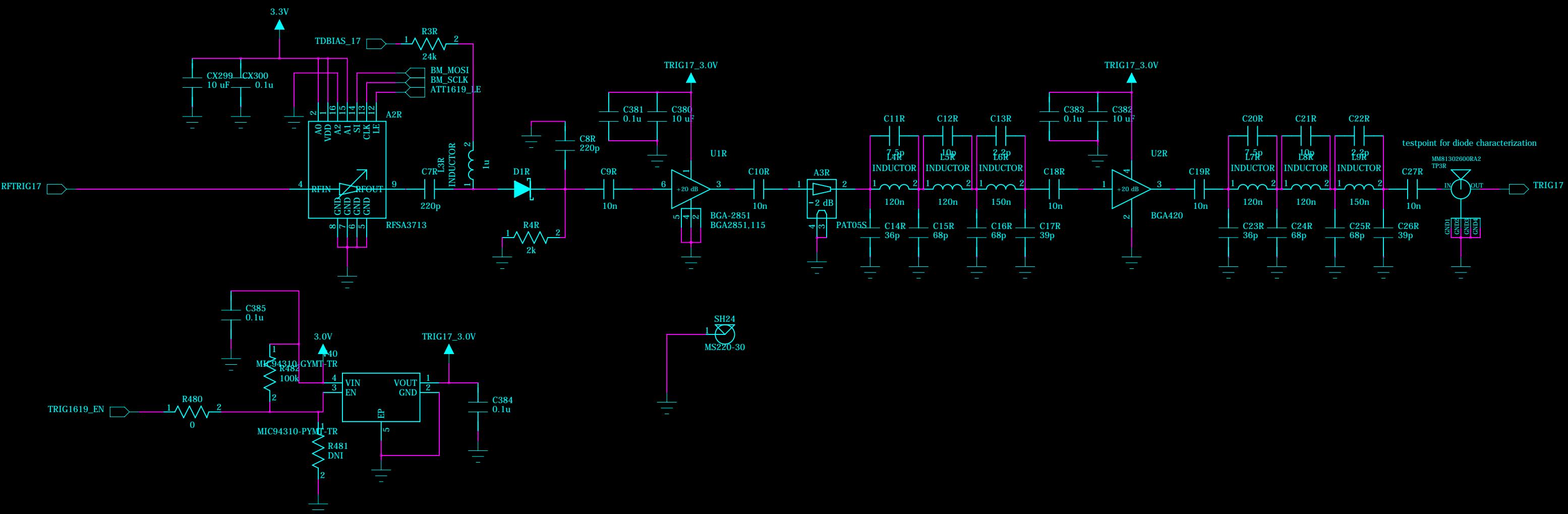
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COMPANY:	Ohio State University		
SHEET:	RF_DIOD17		
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CHECKED:	PSA	DATED:	2/27/20
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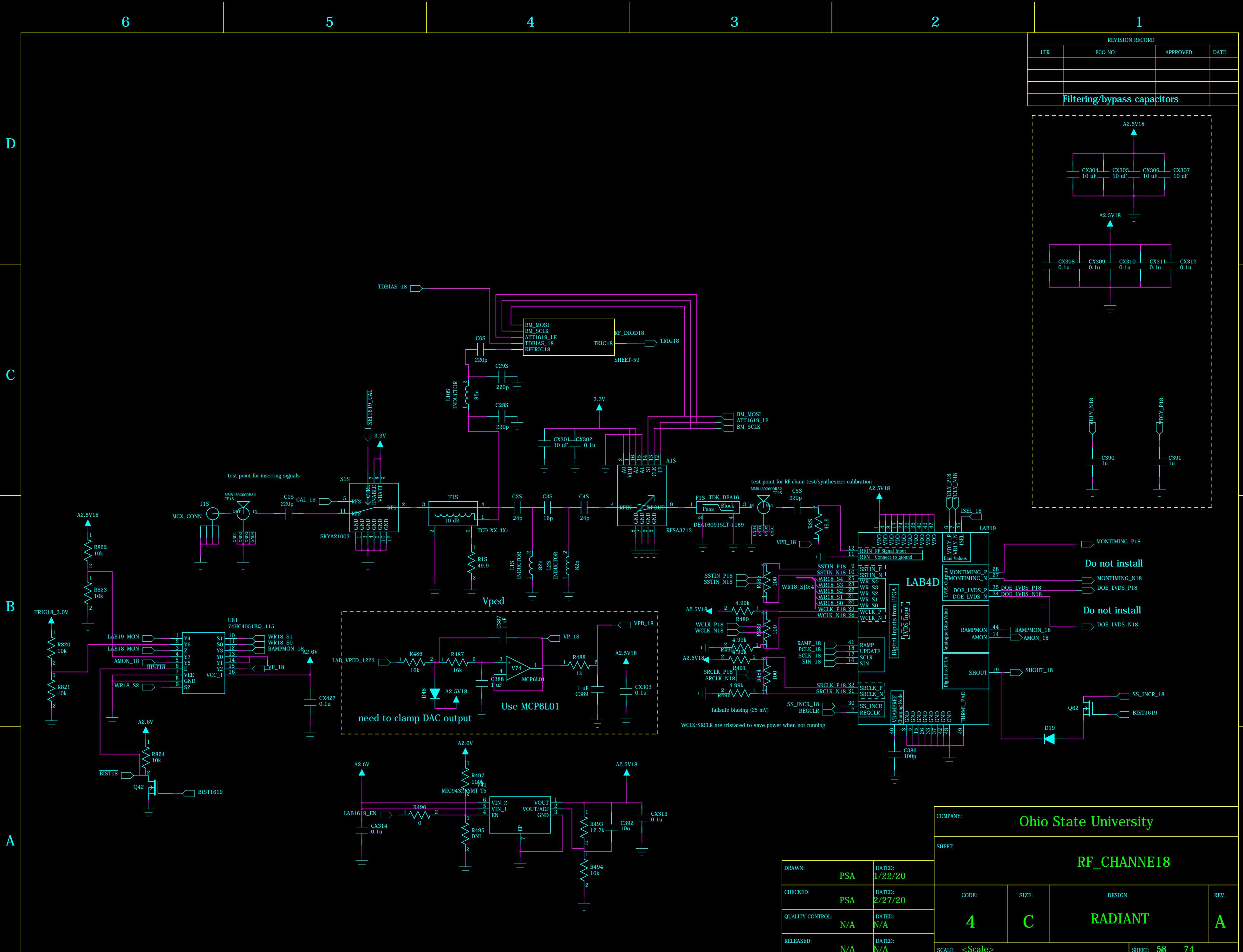
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REVISION RECORD

LTR	ECO NO:	APPROVED:	DATE:

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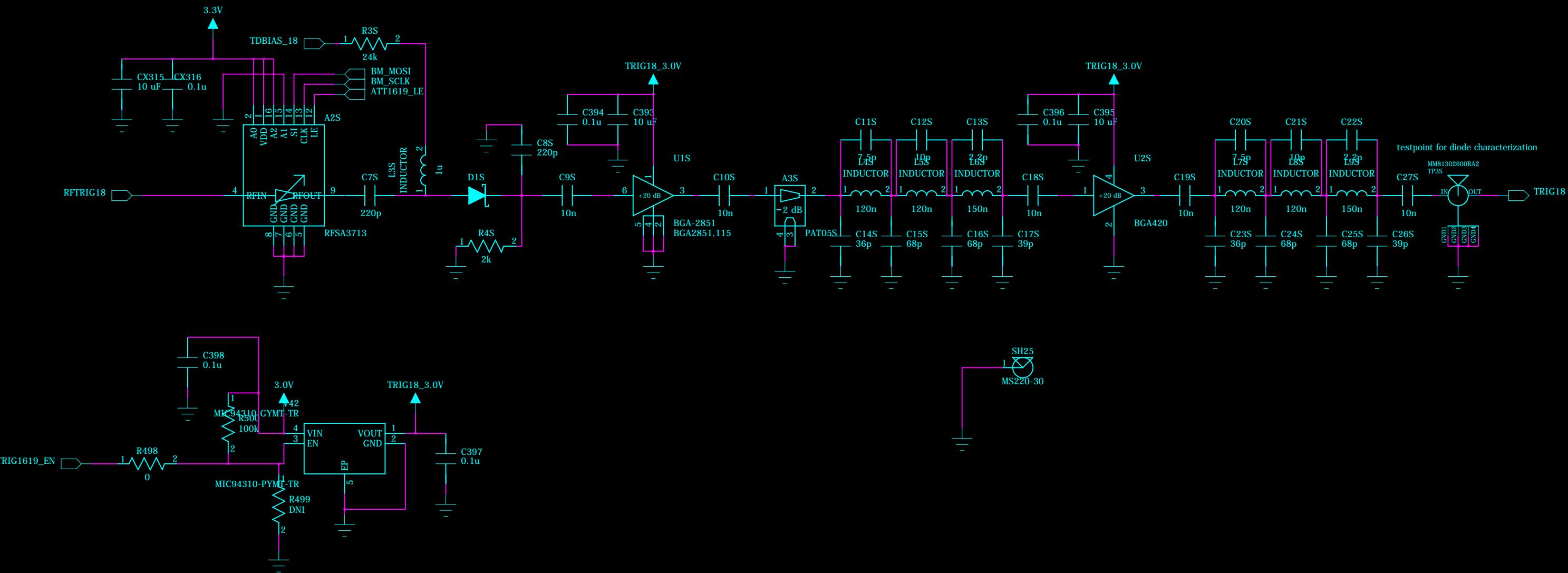
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COMPANY:		Ohio State University		
SHEET:		RF_DIOD18		
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		SCALE:	<Scale>	Sheet: 50 74

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## REVISION RECORD

LTR	ECO NO:	APPROVED:	DATE:

Filtering/bypass capacitors

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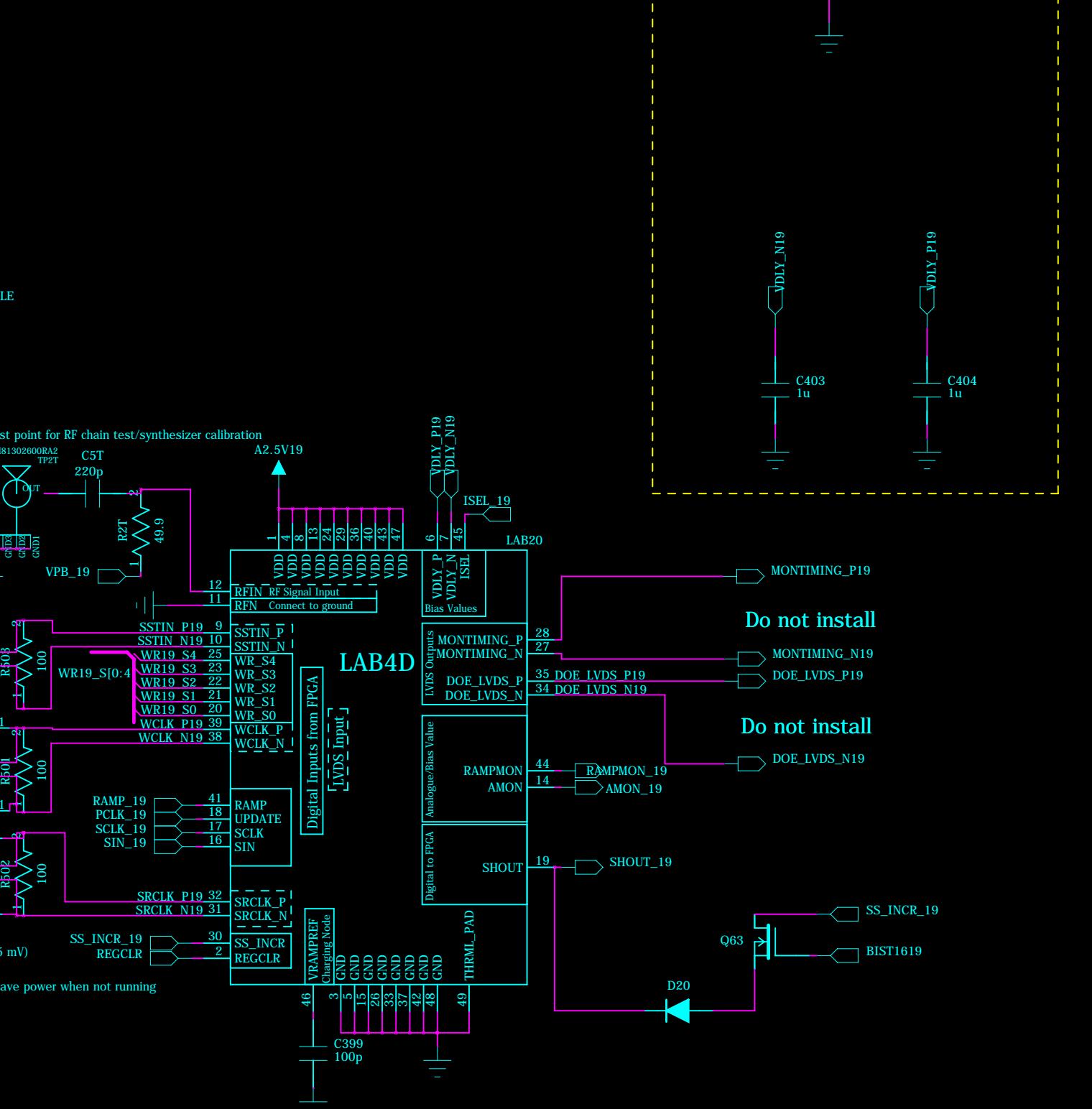
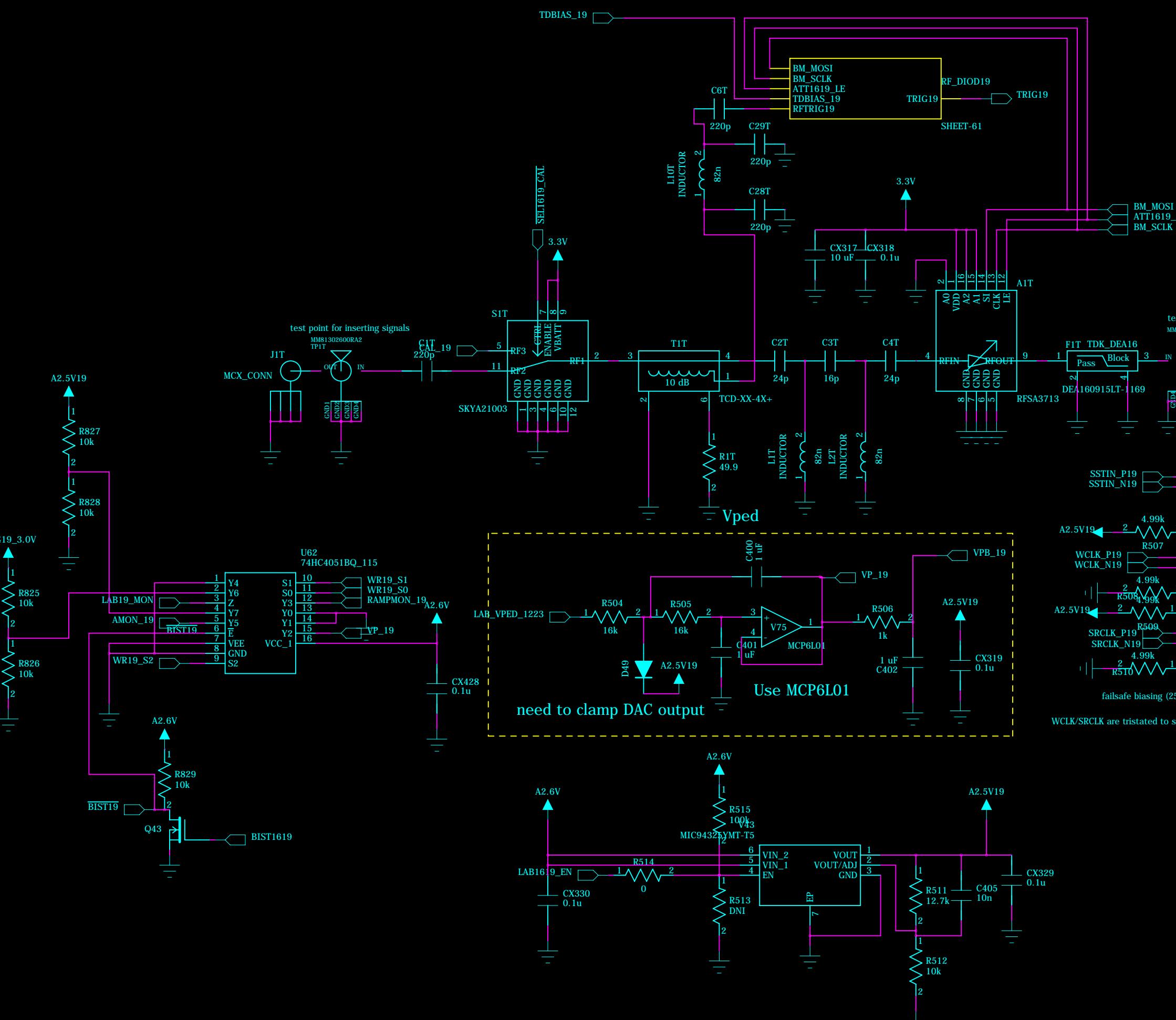
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CHECKED:	PSA	DATED:	2/27/20
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RELEASED:	N/A	DATED:	N/A

COMPANY: Ohio State University

SHEET: RF\_CHANNEL19

CODE: 4 SIZE: C DESIGN: RADIANT REV: A

SCALE: <Scale> SHEET: 66 74

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REVISION RECORD

LTR	ECO NO:	APPROVED:	DATE:

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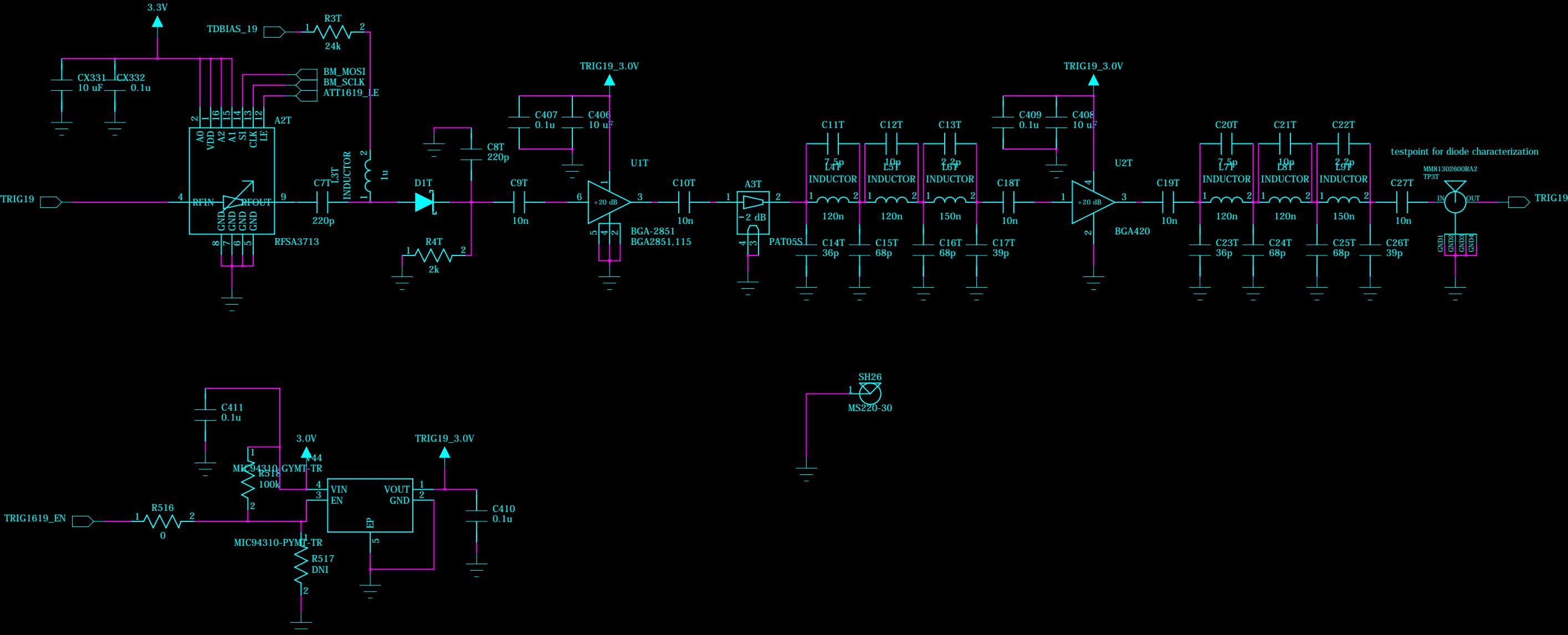
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COMPANY:	Ohio State University		
SHEET:	RF_DIOD19		
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CHECKED:	PSA	DATED:	2/27/20
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DESIGN:	RADIANT		A
REV:		SCALE:	<Scale>
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## REVISION RECORD

LTR	ECO NO:	APPROVED:	DATE:

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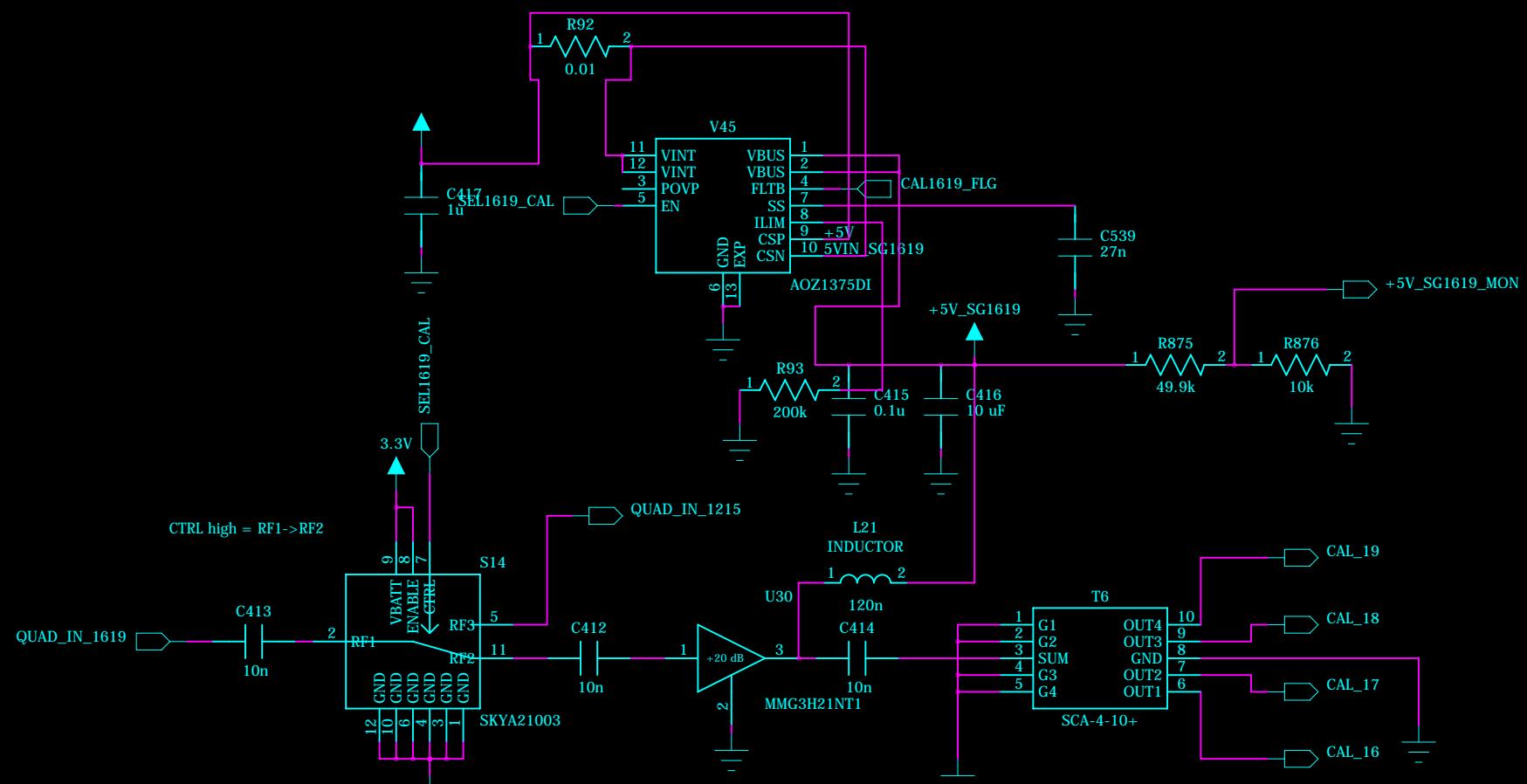
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COMPANY:	Ohio State University		
SHEET:	QUAD_SIG_GENERATOR 4		
DRAWN:	PSA	DATED:	1/22/20
CHECKED:	PSA	DATED:	2/27/20
QUALITY CONTROL:	N/A	DATED:	N/A
RELEASED:	N/A	DATED:	N/A
CODE:	C	SIZE:	RADIANT
REV:	A		
SCALE:	<Scale>		Sheet: 62 74

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## REVISION RECORD

LTR	ECO NO:	APPROVED:	DATE:

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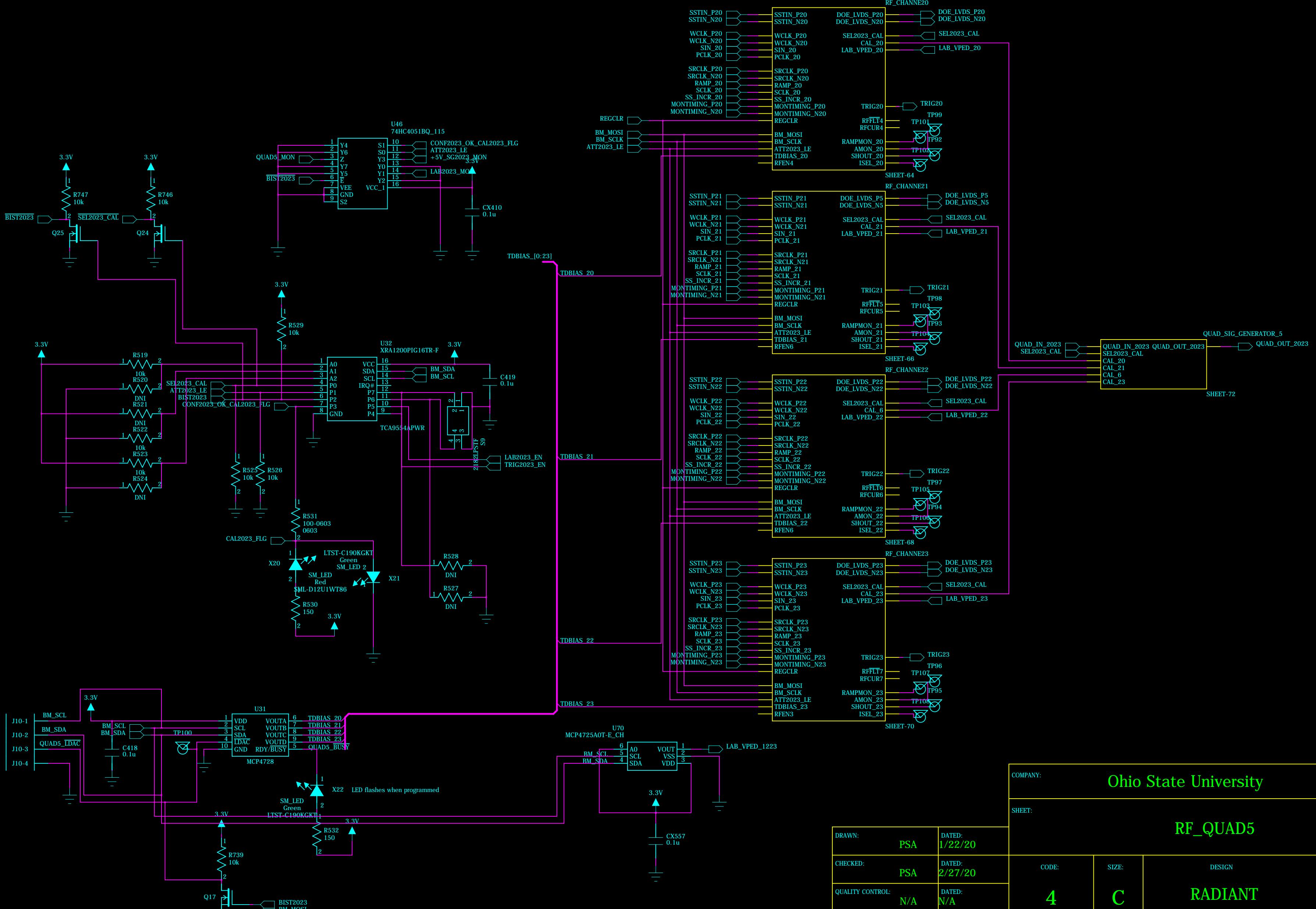
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Ohio State University

RF\_QUAD5

COMPANY:	Ohio State University		
SHEET:	RF_QUAD5		
DRAWN:	PSA	DATED:	1/22/20
CHECKED:	PSA	DATED:	2/27/20
QUALITY CONTROL:	N/A	DATED:	N/A
RELEASED:	N/A	DATED:	N/A
SCALE:	<Scale>		
CODE:	4	SIZE:	C
DESIGN:	RADIANT		
REV:	A		
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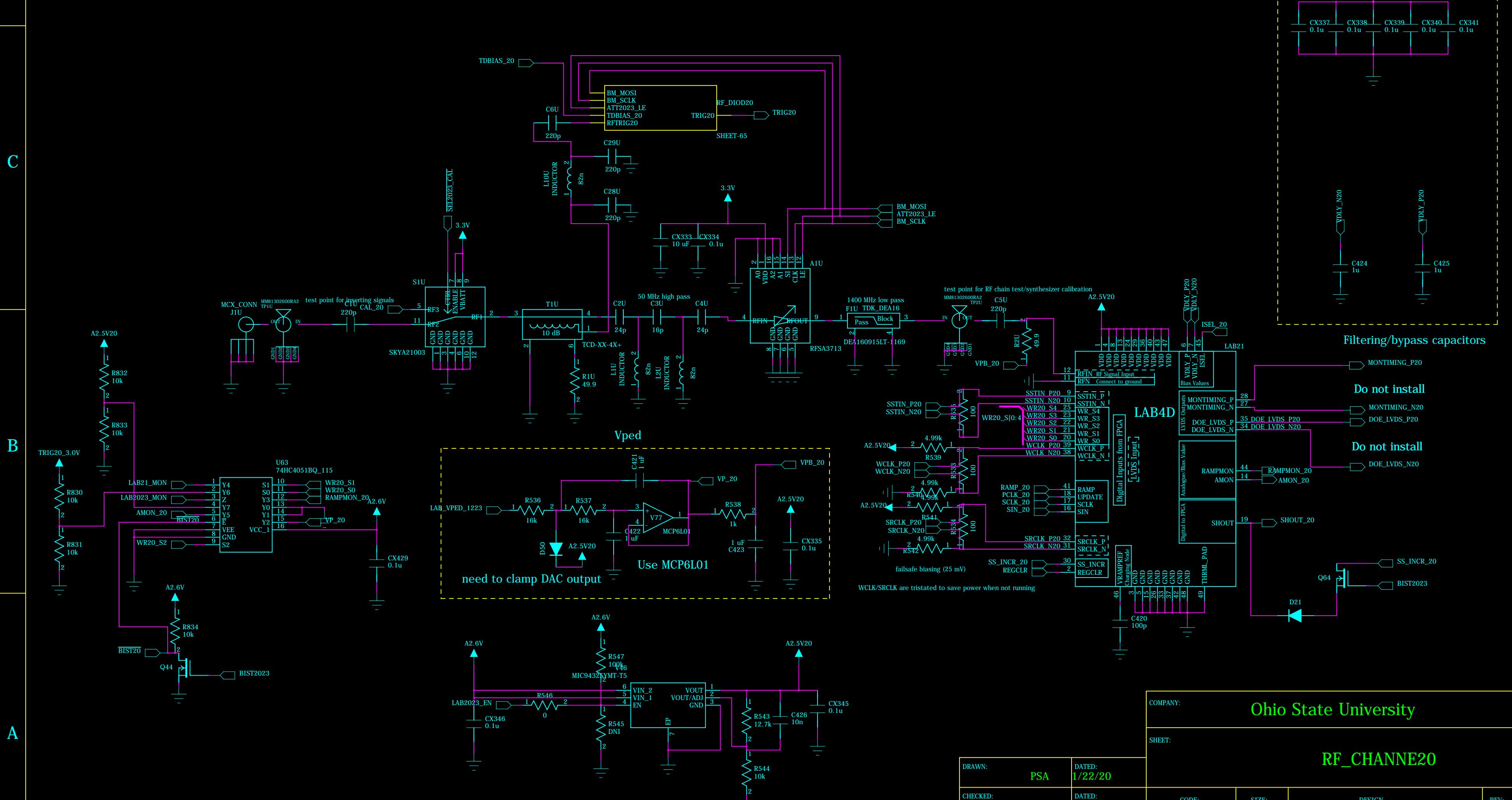
## REVISION RECORD

LTR	ECO NO:	APPROVED:	DATE:

Filtering/bypass capacitors

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Ohio State University

RF\_CHANNEL20

DRAWN:	PSA	DATED:	1/22/20
CHECKED:	PSA	DATED:	2/27/20
QUALITY CONTROL:	N/A	DATED:	N/A
RELEASED:	N/A	DATED:	N/A

SCALE: &lt;Scale&gt; SHEET: 64 74

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## REVISION RECORD

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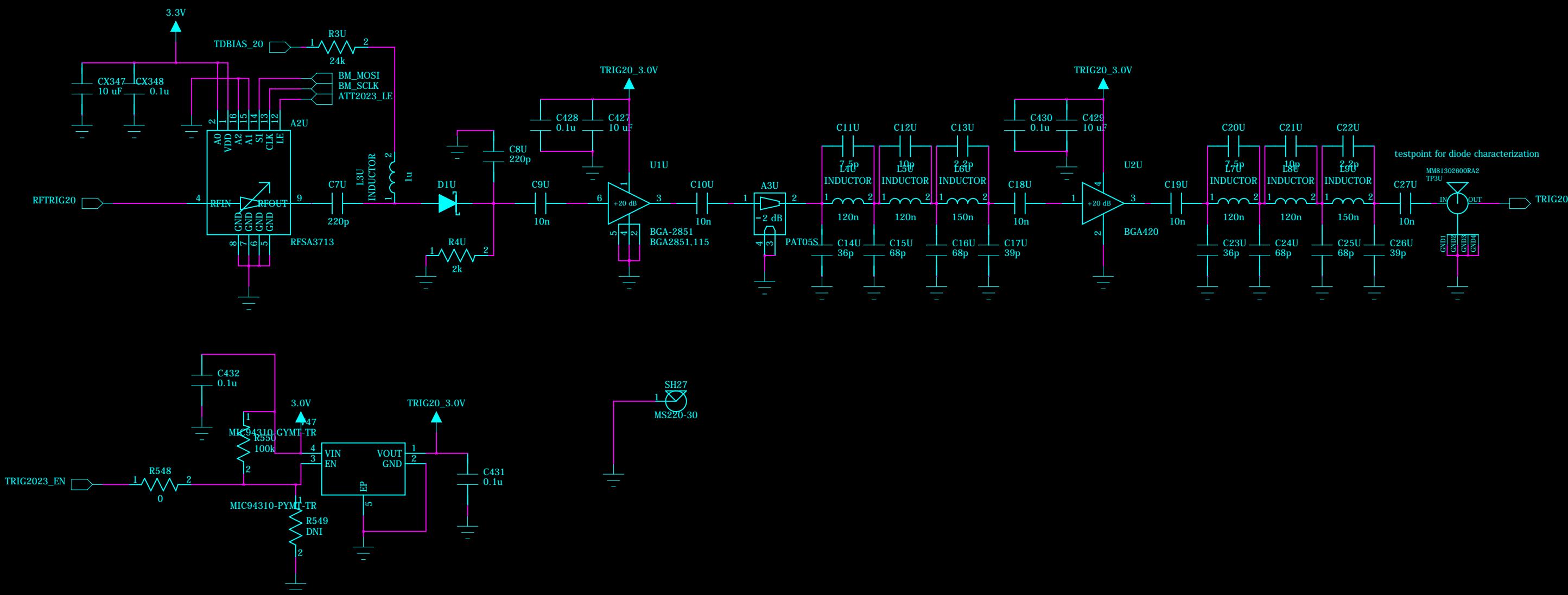
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COMPANY:	Ohio State University		
SHEET:	RF_DIOD20		
DRAWN:	PSA	DATED:	1/22/20
CHECKED:	PSA	DATED:	2/27/20
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REV:		SCALE:	<Scale>
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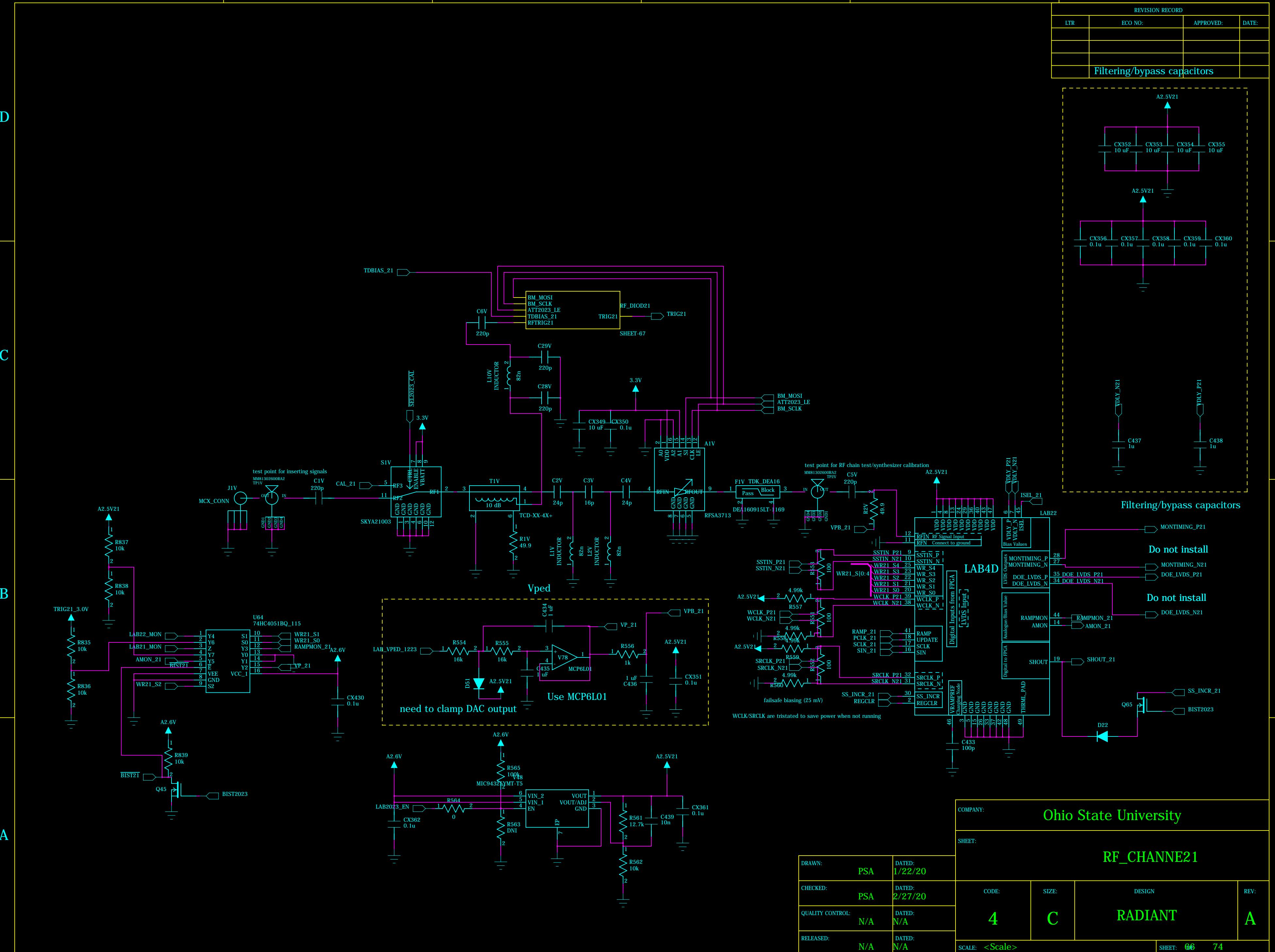
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## REVISION RECORD

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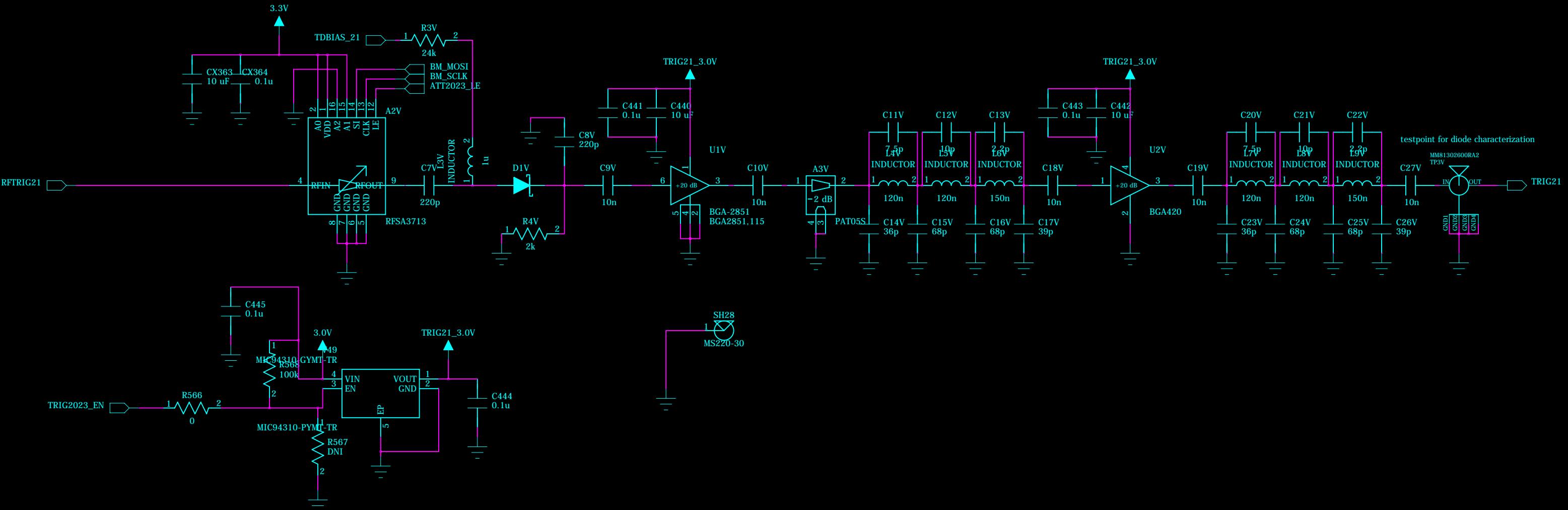
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COMPANY:	Ohio State University		
SHEET:	RF_DIOD21		
DRAWN:	PSA	DATED:	1/22/20
CHECKED:	PSA	DATED:	2/27/20
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CODE:	4	SIZE:	RADIANT
REV:	A	SCALE:	<Scale>
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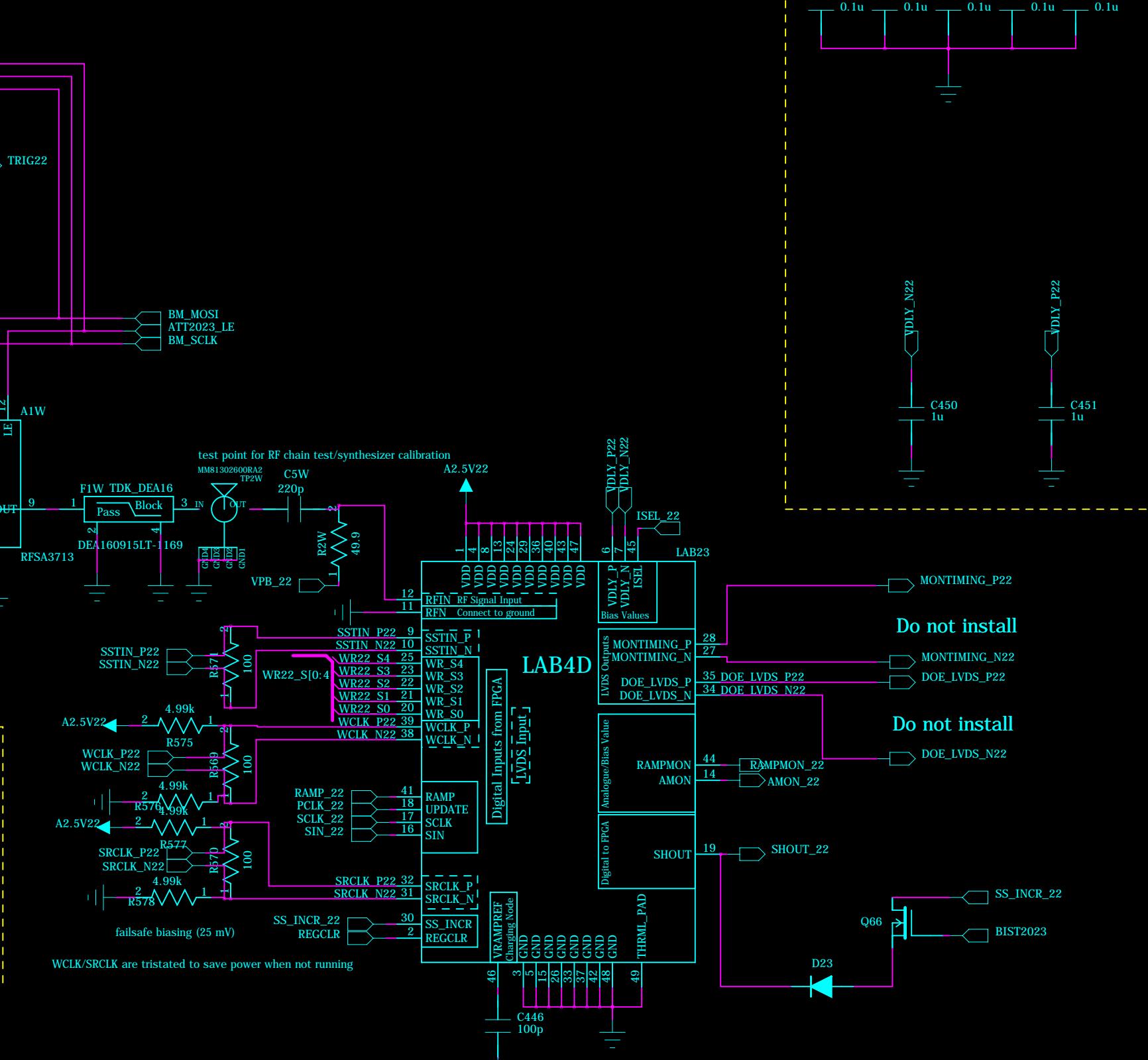
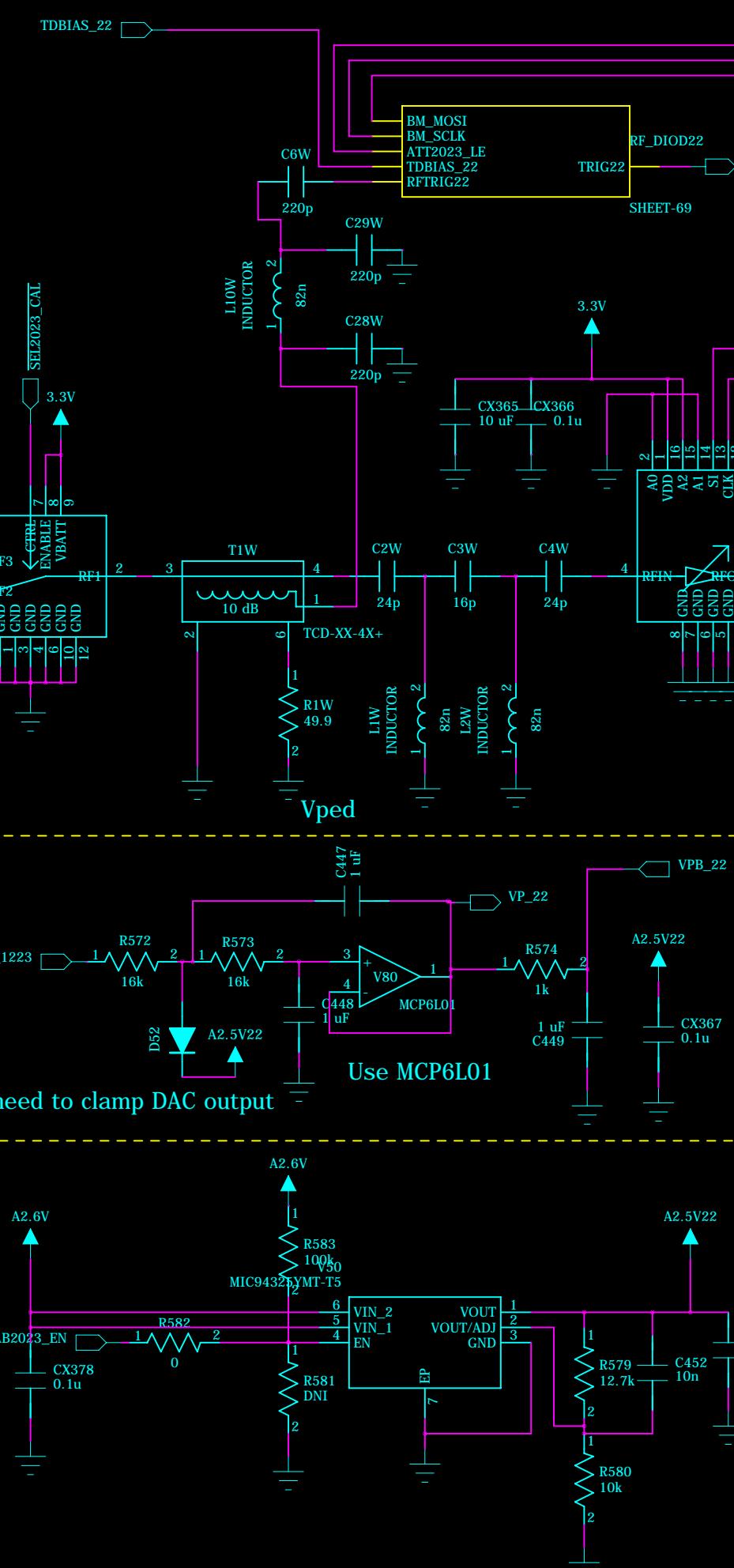
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DRAWN:		PSA	DATED:	1/22/20
CHECKED:		PSA	DATED:	2/27/20
QUALITY CONTROL:		N/A	DATED:	N/A
RELEASED:		N/A	DATED:	N/A
SCALE:	<Scale>		SHEET:	68 74

Ohio State University

RF\_CHANNEL22

RADIANT

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REV: A

CODE: 4

SIZE: C

DESIGN: RADIANT

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## REVISION RECORD

LTR	ECO NO:	APPROVED:	DATE:

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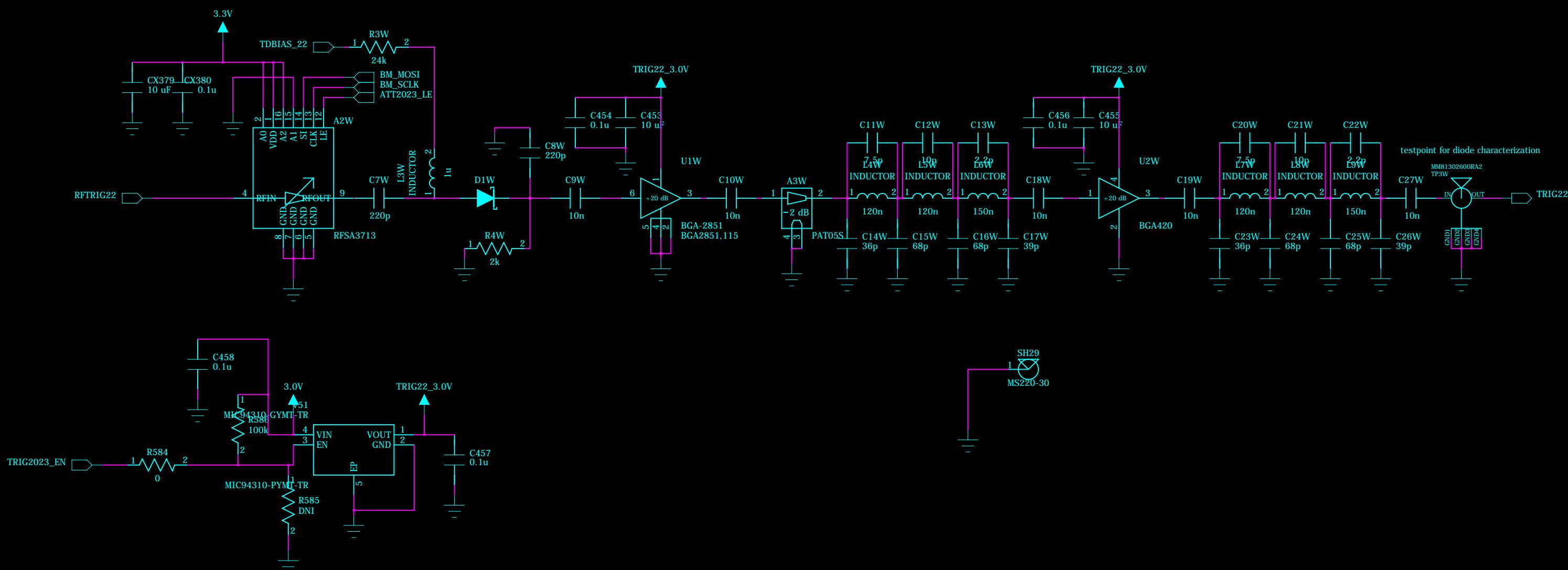
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COMPANY:

Ohio State University

SHEET:

RF\_DIOD22

DRAWN:	PSA	DATED:	1/22/20	CODE: 4 SIZE: C DESIGN: RADIANT REV: A
CHECKED:	PSA	DATED:	2/27/20	
QUALITY CONTROL:	N/A	DATED:	N/A	
RELEASED:	N/A	DATED:	N/A	

SCALE: &lt;Scale&gt; SHEET: 69 74

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## REVISION RECORD

LTR	ECO NO:	APPROVED:	DATE:

Filtering/bypass capacitors

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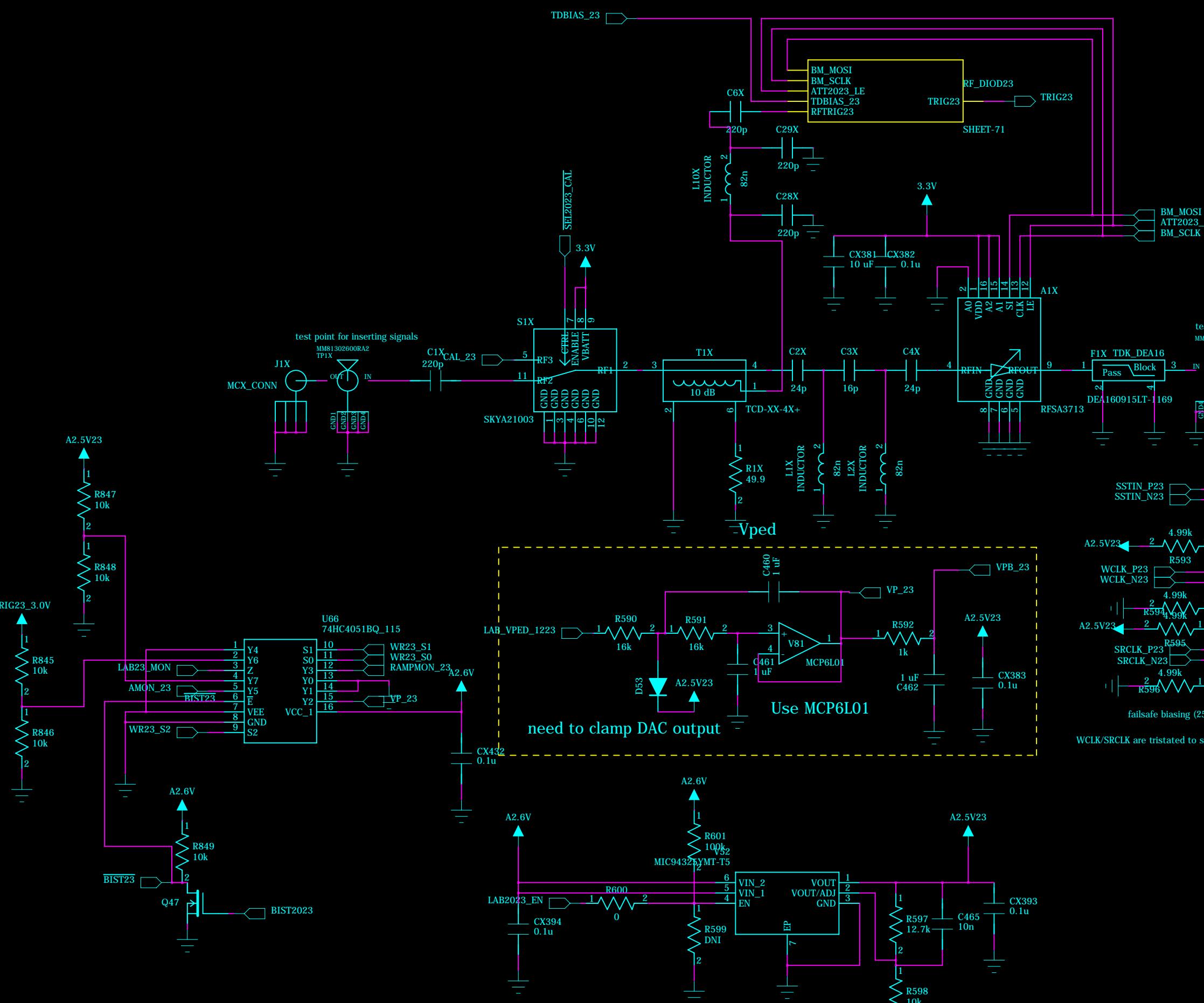
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DRAWN:	PSA	DATED:	1/22/20
CHECKED:	PSA	DATED:	2/27/20
QUALITY CONTROL:	N/A	DATED:	N/A
RELEASED:	N/A	DATED:	N/A

COMPANY: Ohio State University

SHEET: RF\_CHANNEL23

CODE: 4 SIZE: C DESIGN: RADIANT REV: A

SCALE: <Scale> SHEET: 76 74

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## REVISION RECORD

LTR	ECO NO:	APPROVED:	DATE:

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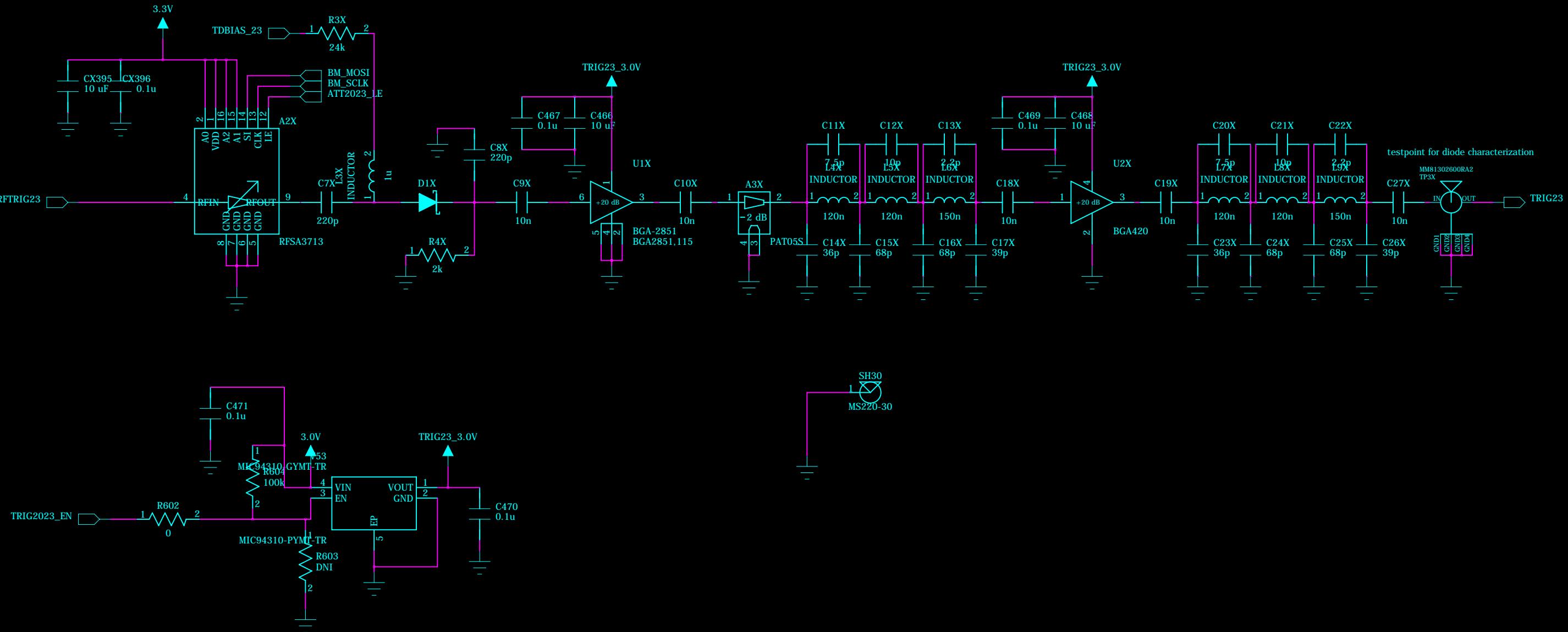
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COMPANY:		Ohio State University		
SHEET:		RF_DIOD23		
DRAWN:	PSA	DATED:	1/22/20	
CHECKED:	PSA	DATED:	2/27/20	
QUALITY CONTROL:	N/A	DATED:	N/A	
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CODE:		SIZE:	DESIGN	REV:
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SCALE: <Scale>		SHEET: 74	74	

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REVISION RECORD

LTR	ECO NO:	APPROVED:	DATE:

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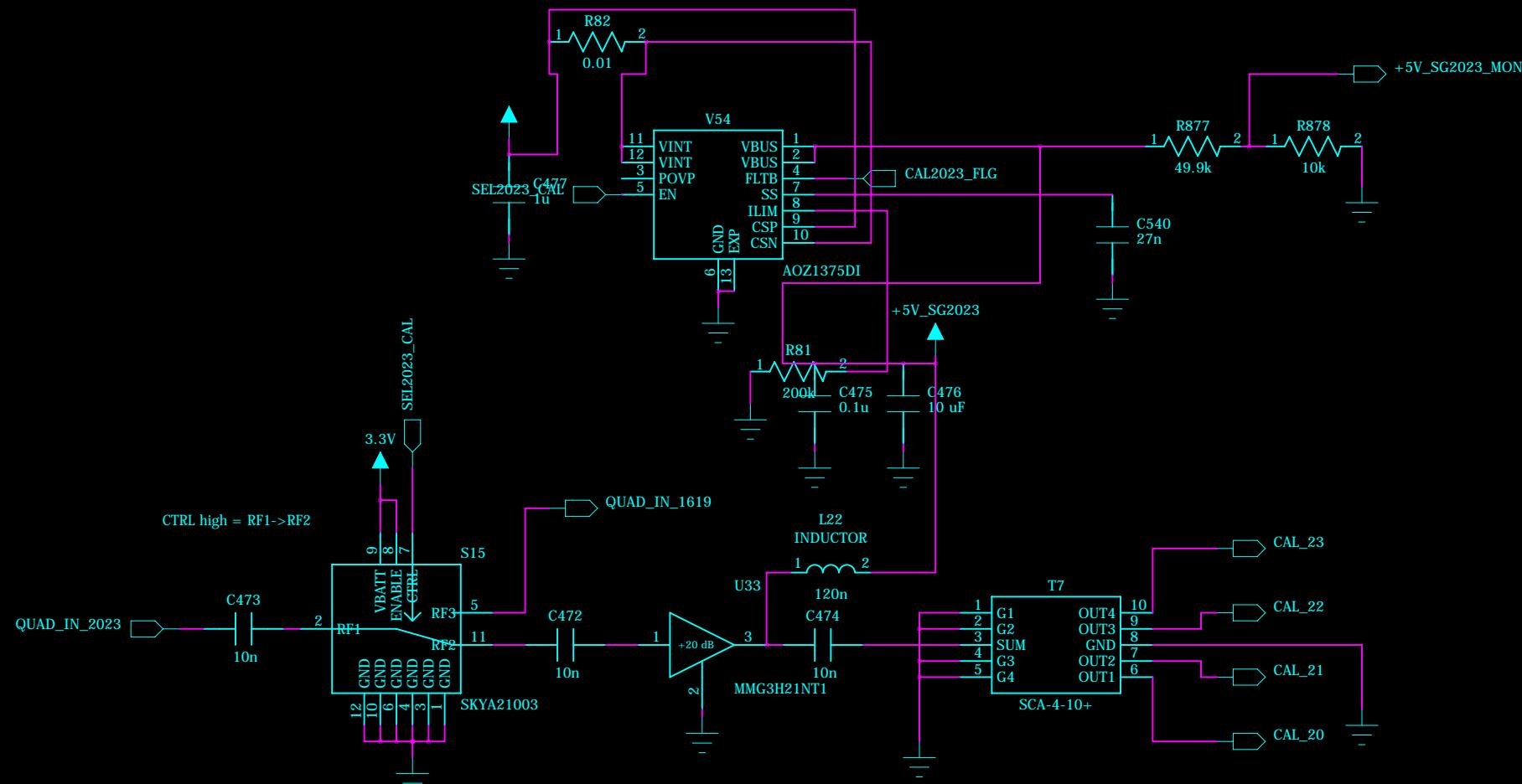
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COMPANY:	Ohio State University		
SHEET:	QUAD_SIG_GENERATOR 5		
DRAWN:	PSA	DATED:	1/22/20
CHECKED:	PSA	DATED:	2/27/20
QUALITY CONTROL:	N/A	DATED:	N/A
RELEASED:	N/A	DATED:	N/A
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Sheet:	74		

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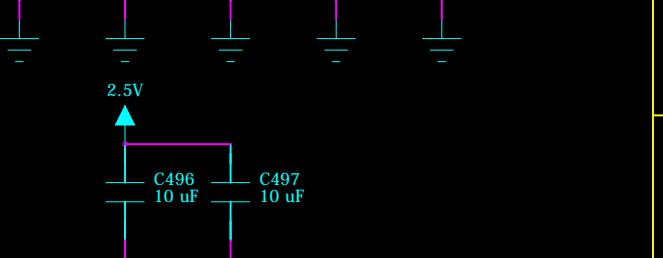
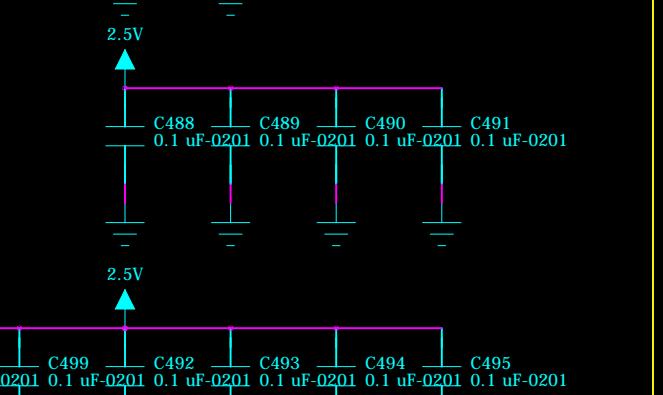
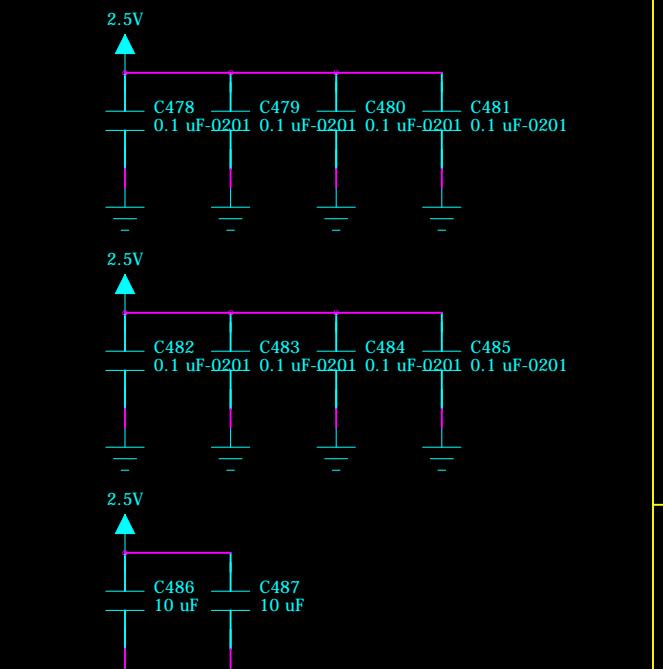
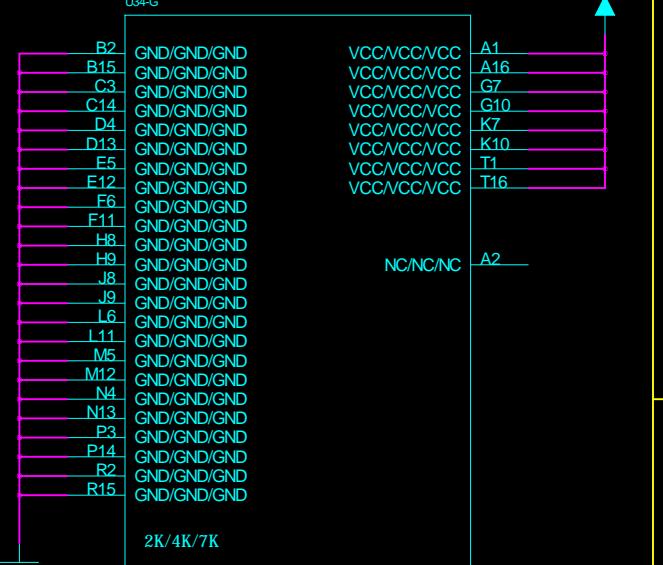
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## REVISION RECORD

LTR	ECO NO:	APPROVED:	DATE:



COMPANY:		Ohio State University				AUX_CPLD1			
SHEET:									
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CHECKED:	PSA	DATED:	2/27/20						
QUALITY CONTROL:	N/A	DATED:	N/A						
RELEASED:	N/A	DATED:	N/A						
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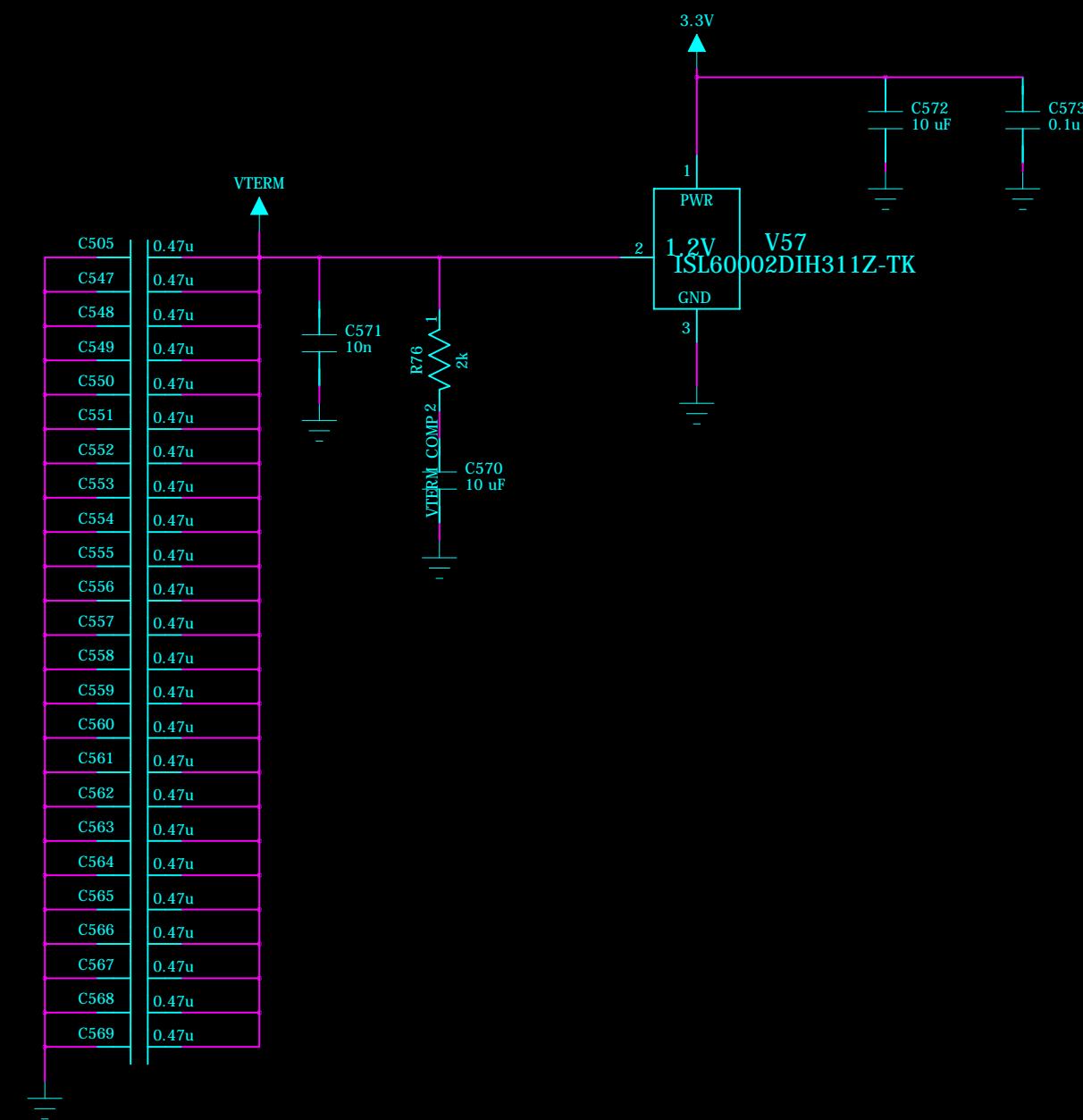
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REVISION RECORD			
ltr	ECO NO:	APPROVED:	DATE:

COMPANY:		Ohio State University		
SHEET:		VTERM		
DRAWN:	PSA	DATED:	DESIGN	
CHECKED:	PSA	DATED:		REV:
QUALITY CONTROL:	N/A	DATED:		
RELEASED:	N/A	DATED:	RADIANT	A
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