

DESCRIPTION

The EVREF0102A is the analog power module for ZCU1275 Zynq UltraScale+ RFSoc Characterization Kit. The EVREF0102 analog power module provides ultra-low noise power supply for the high speed data converters on the ZCU1275 development kit.

The EVREF0102A employs five high efficiency step-down switched-mode power modules with integrated inductors. MPM3833C is a 6V, 3A, ultra-small step down power module and MPM 3683-7 is a 16V, 8A power module. Both power modules feature integrated protection functions including OCP, OVP and UVP. EVREF0102A achieves a significant efficiency improvement compared to the traditional LDO solution. The EVREF0102A analog power module also achieves ultra-low noise level to meet the

specifications of Xilinx high-speed data converter by leveraging the forced continuous conduction mode (CCM) operation and implementing post passive filters. CLC passive filters are utilized for the two most sensitive ADC and DAC rails and capacitive filters are utilized for the rest of power rails. The voltage rails are summarized in Table 1.

Table 1: Voltage Rails Summary

Rail Name	Part Number	Description	Qty
ADC_AVCC	MPM3833C	6V, 3A, Ultra-small Power Module	4
ADC_AVCCAUX			
DAC_AVCCAUX			
DAC_AVTT			
DAC_AVCC	MPM3683-7	16V, 8A, Power Module	1

PERFORMANCE SUMMARY

T_A = 25°C, unless otherwise noted.

Rail Name	Input Voltage	Voltage Set-Point Accuracy	Switching Frequency	Output Voltage	Max Current	Efficiency at Max. Current	Max. Voltage Ripple
ADC_AVCC	5V	±1%	1.2MHz	0.925V	2A	78%	0.52 mVpp
ADC_AVCCAUX		±1%	1.2MHz	1.8V	2A	87%	1.04 mVpp
DAC_AVCC		±1%	800kHz	0.925V	3.5A	91%	0.88 mVpp
DAC_AVCCAUX		±1%	1.2MHz	1.8V	2A	87%	0.84 mVpp
DAC_AVTT		±1%	1.2MHz	2.5 and 3.0V ⁽¹⁾	2A	92%	2.08 mVpp

(1)DAC_AVTT has two typical voltages and is selectable by using a jumper connector.

QUICK-START GUIDE

1. Set the output voltage of the DAC_AVTT rails to the desired value by placing the jumper connector on JP5. Two typical voltages 2.5 and 3.0V are available for selection.
2. Plug the EVREF0102A analog power module onto the ZCU1275 development board.
3. Power up the ZCU 1275 development board. Please refer to the user guide of ZCU 1275 for detailed power-up instruction. Visit www.xilinx.com/zcu1275/support

CONNECTOR PIN DESCRIPTIONS

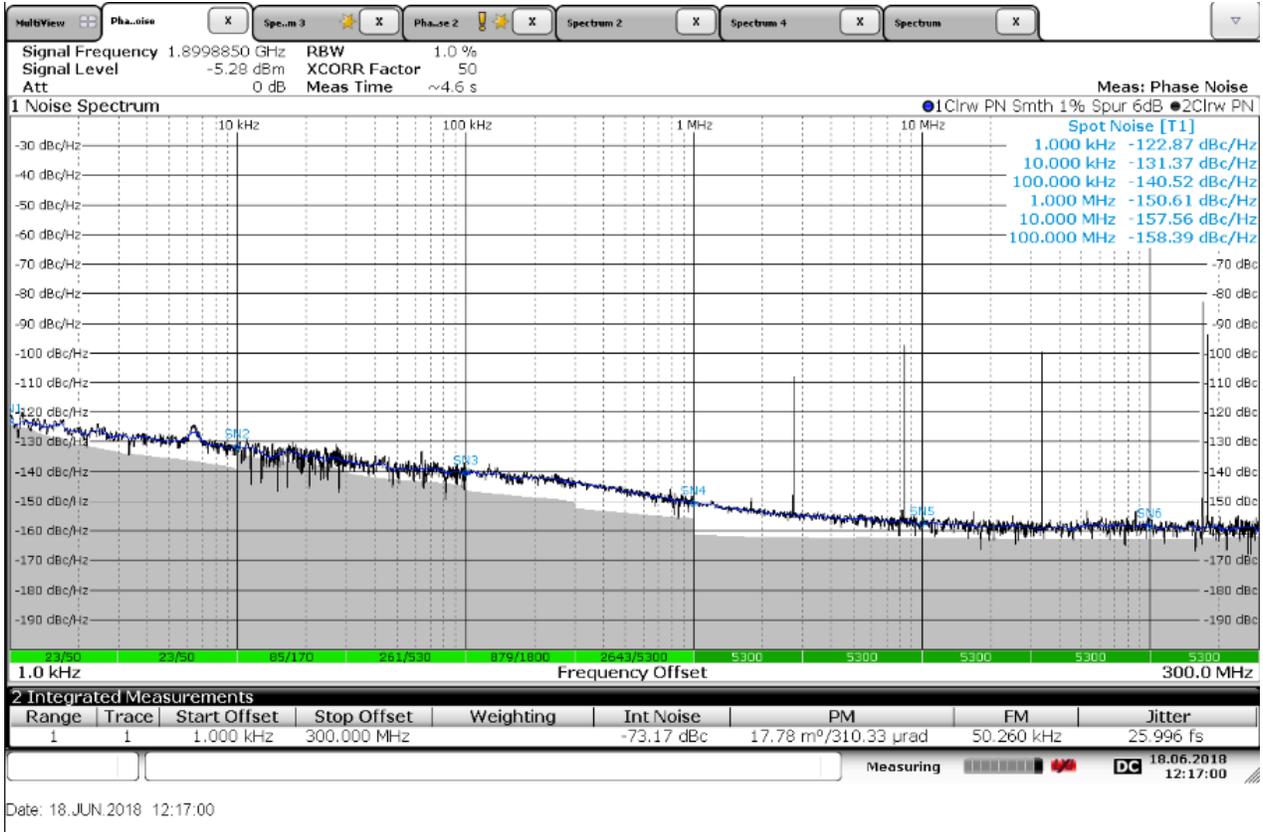
The EVREF0102A analog power module features one 70-pin signal connector and two 10-pin power connectors. The pins definition of the connectors is listed below.

Pin Number	Name	Description
Connector J1, 70-Pin Signal Connector		
1-50, 52, 54, 56, 58, 60, 62-68, 70	NC	Not connected.
51	GND	Ground.
53	DAC_AVCC_PG	DAC_AVCC power good, open-drain output. Tri-stated when output is within set-point tolerance, else pulled to GND. Pulled up to 3.3V on the base board through a 10k Ohm resistor.
55	DAC_AVTT_PG	DAC_AVTT power good, open-drain output. Tri-stated when output is within set-point tolerance, else pulled to GND. Pulled up to 3.3V on the base board through a 10k Ohm resistor.
57	DAC_AVCCAUX_PG	DAC_AVCCAUX power good, open-drain output. Tri-stated when output is within set-point tolerance, else pulled to GND. Pulled up to 3.3V on the base board through a 10k Ohm resistor.
59	ADC_AVCC_PG	ADC_AVCC power good, open-drain output. Tri-stated when output is within set-point tolerance, else pulled to GND. Pulled up to 3.3V on the base board through a 10k Ohm resistor.
61	ADC_AVCCAUX_PG	ADC_AVCCAUX power good, open-drain output. Tri-stated when output is within set-point tolerance, else pulled to GND. Pulled up to 3.3V on the base board through a 10k Ohm resistor.
69	POR_B	Power on reset input. All voltage outputs are disabled when low (0V) and enabled when POR_B is high (3.3V). POR_B is driven open-drain from the base board and pulled up to 3.3V through a 10k Ohm resistor.
Connector J2 10-Pin Power Connector		
2, 4, 6, 8	GND	Ground.
1	VCC5V0	5.0V input supply.
3, 5, 7, 9, 10	NC	Not connected.
Connector J3, 10-Pin Power Connector		
2, 4, 6, 8, 10	GND	Ground.
1	ADC_AVCC	ADC_AVCC rail output.
3	DAC_AVCC	DAC_AVCC rail output.
5	DAC_AVCCAUX	DAC_AVCCAUX rail output.
7	ADC_AVCCAUX	ADC_AVCCAUX rail output.
9	DAC_AVTT	DAC_AVTT rail output.

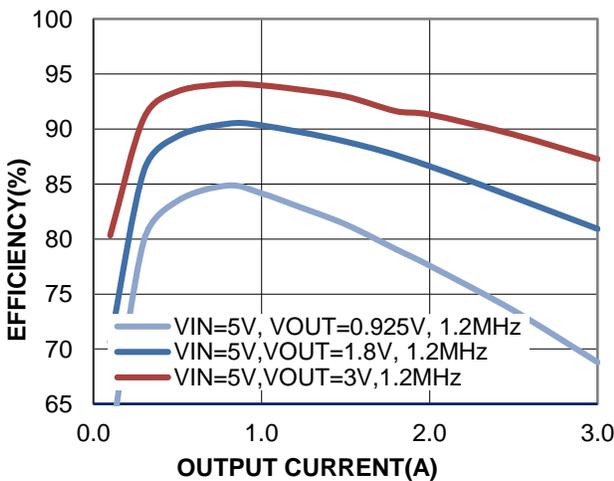
TYPICAL PERFORMANCE CHARACTERISTICS

$V_{IN} = 5V$, $T_A = 25^\circ C$, unless otherwise noted.

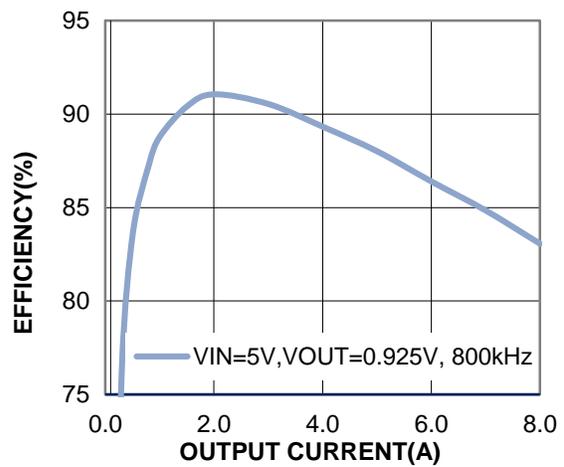
Phase Noise Measurement of the High-Speed Data Converter on the ZCU1275 Development Kit



5V Input Efficiency of MPM3833C



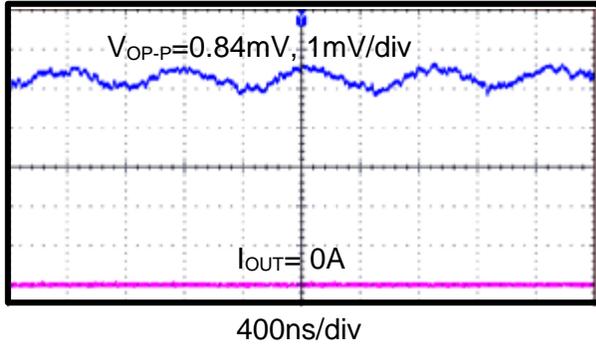
5V Input Efficiency of MPM3683-7



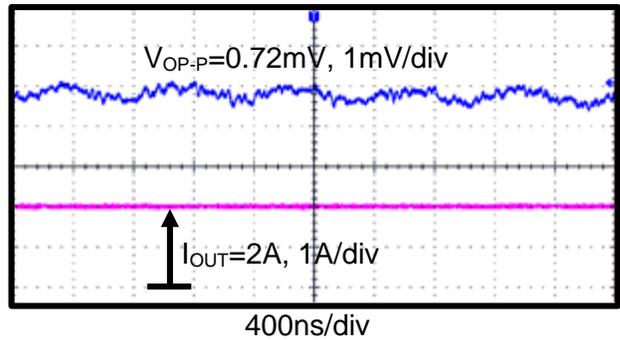
TYPICAL PERFORMANCE CHARACTERISTICS (continued)

$V_{IN} = 5V$, $T_A = 25^\circ C$, unless otherwise noted.

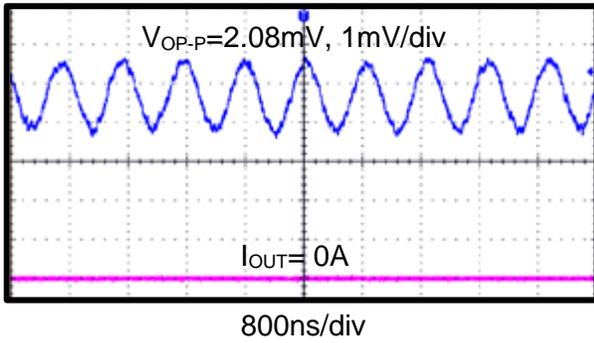
DAC_AVCCAUX Rail Voltage Ripple at No Load



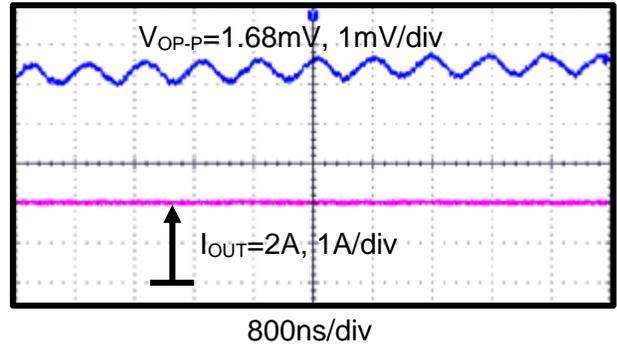
DAC_AVCCAUX Rail Voltage Ripple at 2A Load



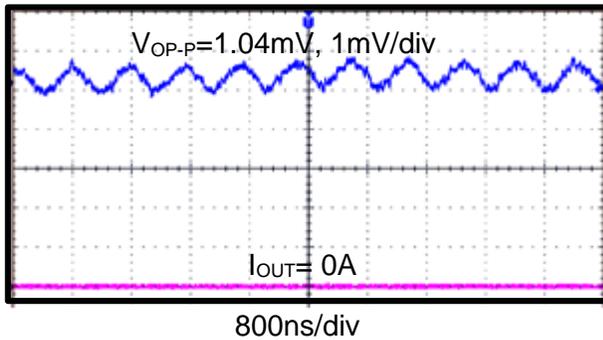
DAC_AVTT Voltage Ripple at No Load



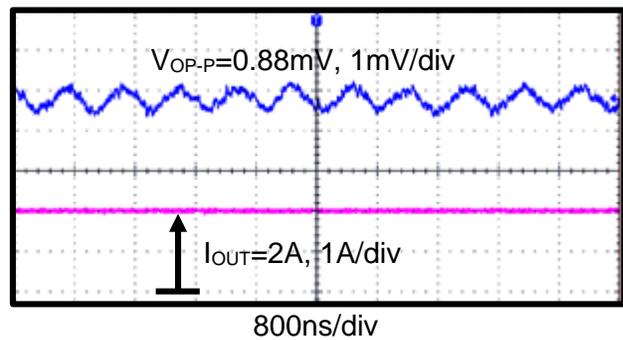
DAC_AVTT Voltage Ripple at 2A Load



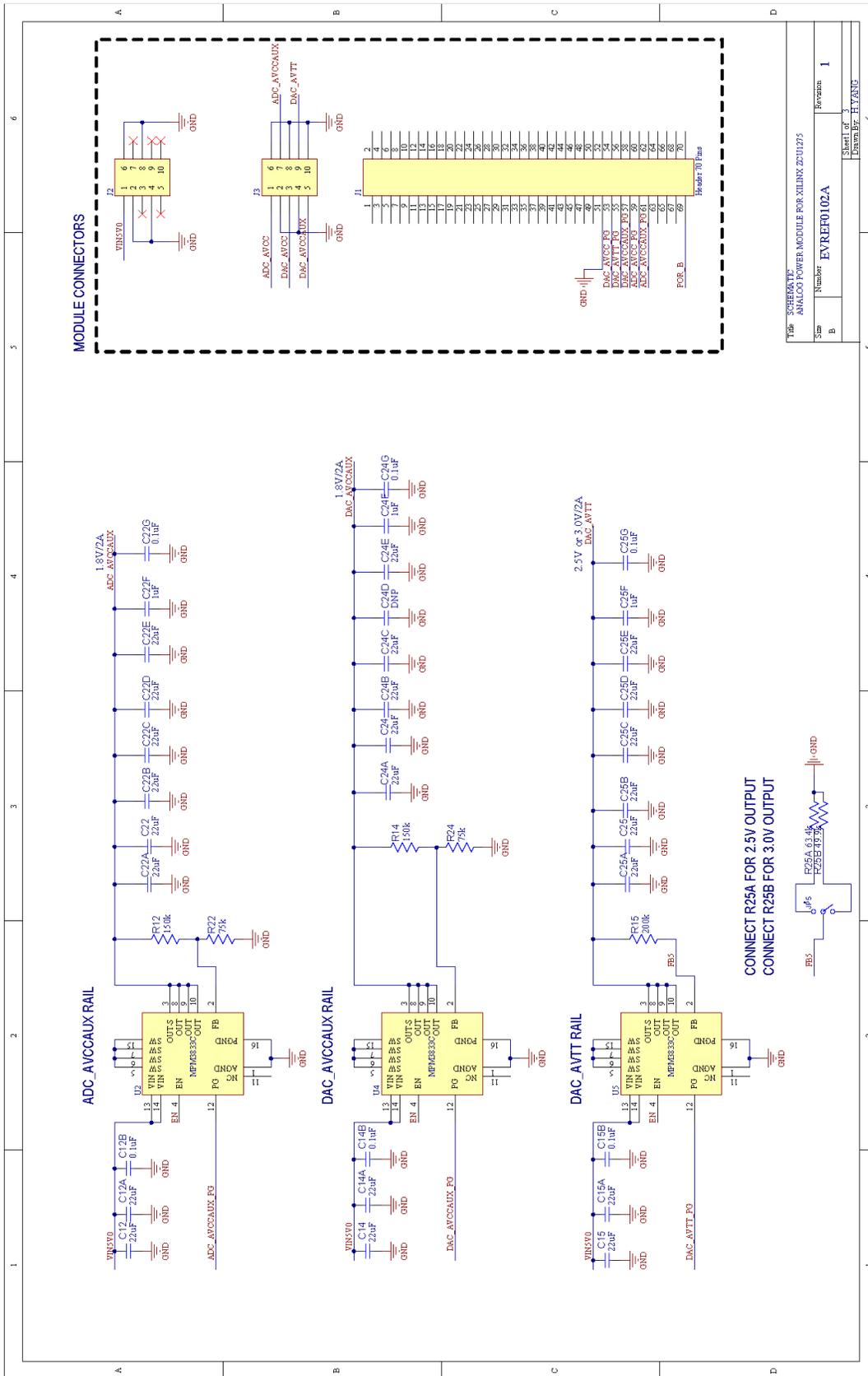
ADC_AVCCAUX Voltage Ripple at No Load



ADC_AVCCAUX Voltage Ripple at 2A Load



EVREF0102A SCHEMATIC



THESE SCHEMATICS ARE AN ANALOG POWER MODULE FOR XILINX ZCU1275	
Size	Number
B	EVREF0102A
Revision	1
Sheet 1 of 3	
Drawn By:	PT283US

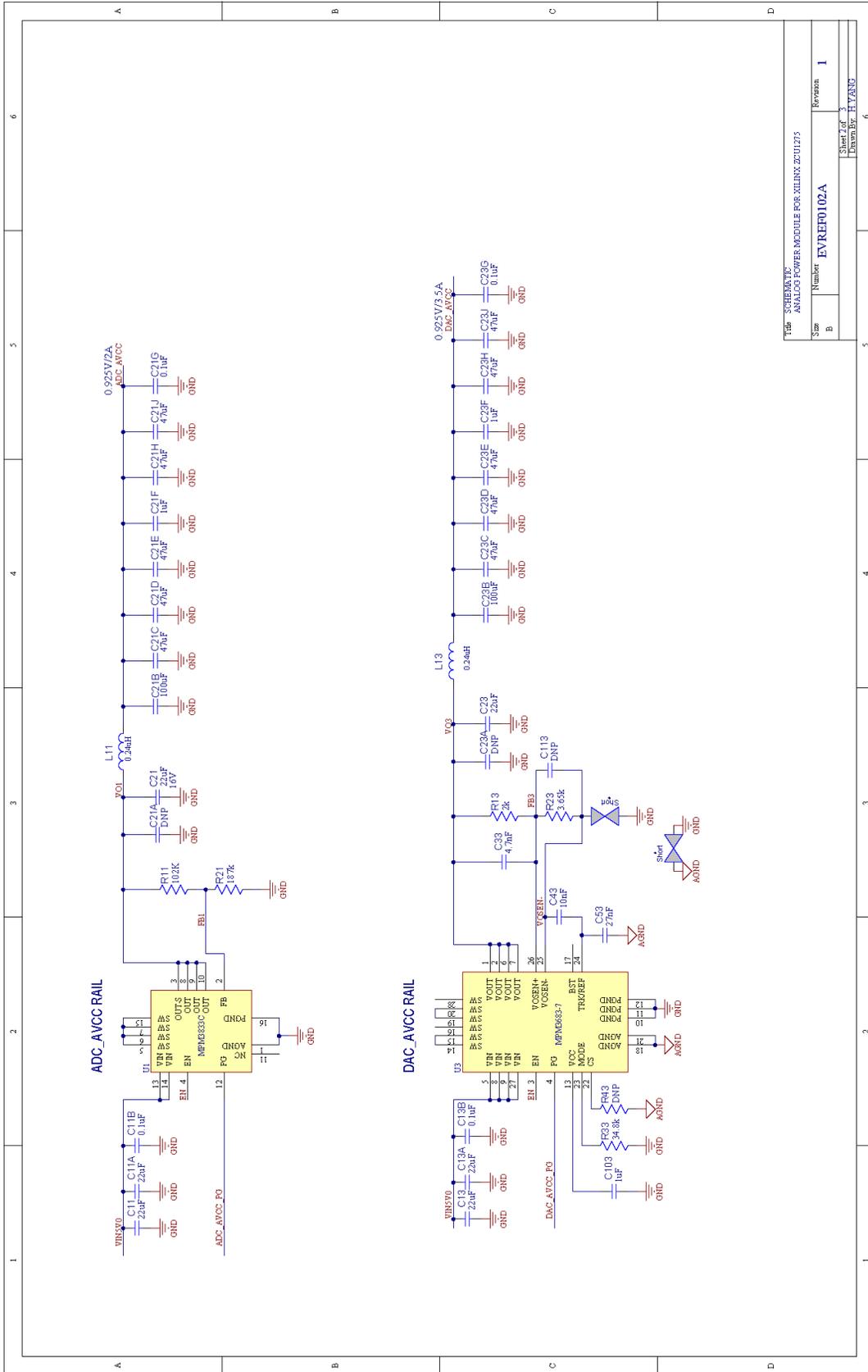
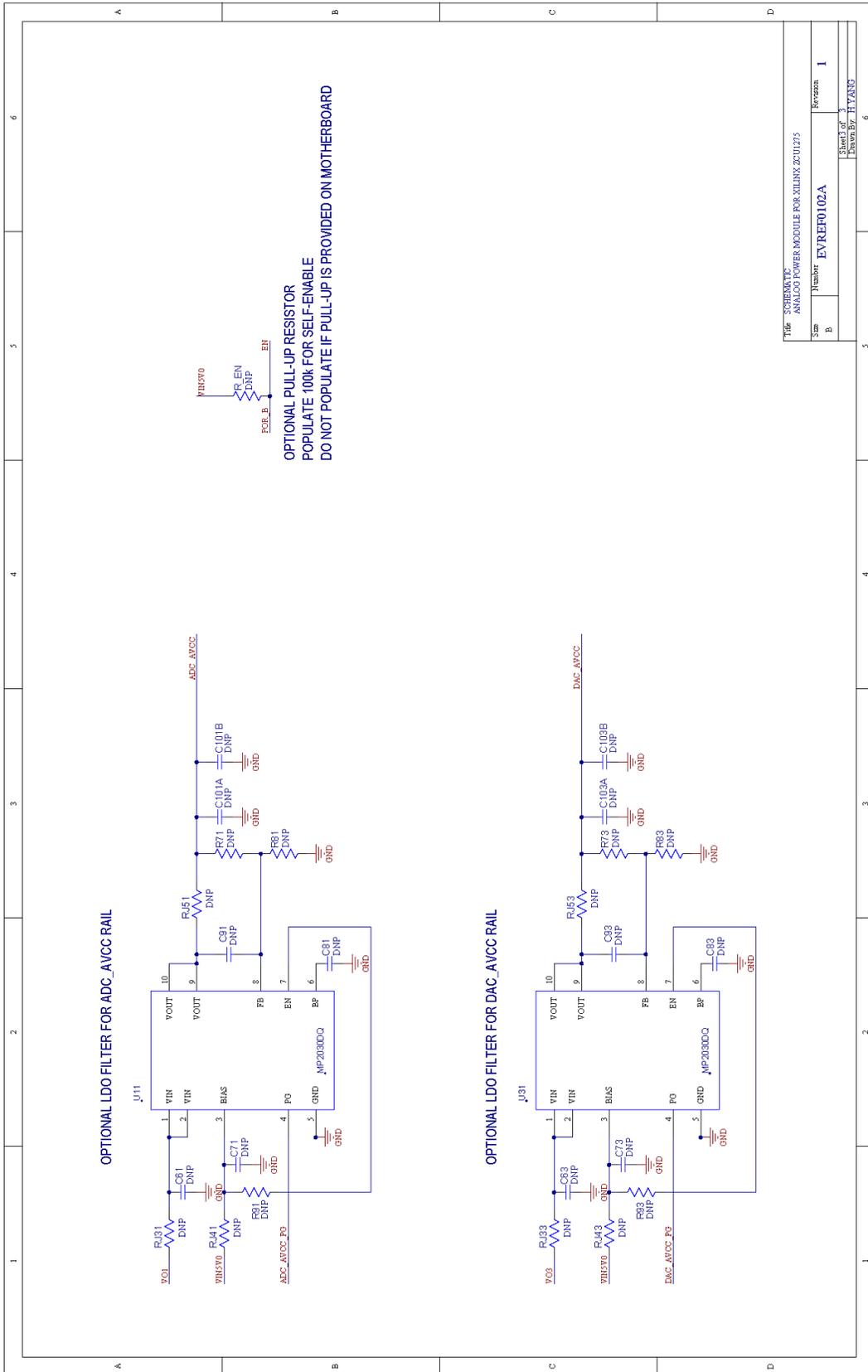


Table SCHEMATIC
ANALOG POWER MODULE FOR XILINX ZCU1275

Sheet Number	1
Revision	1
Part Number	EVREF0102A
Sheet 1 of 1	
Lower Ver. H.V.A.N.G.	



COMPONENTS LIST

ITEM	QTY	DESIGNATOR	MANUFACTURER/PART NUMBER	CASE	DESCRIPTION
1	29	C11,C11A,C12,C12A,C13,C13A,C14,C14A,C15,C15A,C21,C22A,C22,C22B,C22C,C22D,C22E,C23,C24A,C24,C24B,C24C,C24E,C25A,C25,C25B,C25C,C25D,C25E	Murata, GRM21BR61E226ME44L	0805	CAP., 25V, 22uF, 0805
2	10	C21C,C21D,C21E,C21H,C21J,C23C,C23D,C23E,C23H,C23J	Murata, GRM21BR60J476ME15	0805	CAP., 6.3V, 47uF, 0805
3	2	C21B,C23B	Panasonic, 6TPH100MAEA	A09	POSCAP, 6.3V,100uF
4	5	C21F,C22F,C23F,C24F,C25F	Murata, GRM185R61C105KE44D	0603	CAP., 16V, 1uF, 0603,
5	10	C11B,C21G,C12B,C22G,C13B,C23G,C14B,C24G,C15B,C25G	Murata, GRM155R61C104KA88D	0402	CAP., 16V, 0.1uF, 0402
6	1	C103	Murata, GRM155R70J105KA12D	0402	CAP., 6.3V, 1uF, 0402
7	2	L11,L13	Murata, DFE201612E-R24MP2	2016	INDUCTOR, 0.24uH, 5A
8	1	C43	Murata, GRM155R71C103KA01D	0402	CAP., 16V, 10nF, 0402
9	1	C33	Murata, GRM155R71E472KA01D	0402	CAP., 25V, 4.7nF, 0402
10	1	C53	Murata, GRM155R61C273KA01D	0402	CAP., 16V, 27nF, 0402
11	1	R13	Any	0402	RES., 2k, 0402, 1%
12	1	R33	Any	0402	RES., 34.8K, 0402, 1%
13	1	R11	Any	0402	RES., 102K, 0402, 1%
14	2	R12, R14	Any	0402	RES., 150K, 0402, 1%
15	2	R22, R24	Any	0402	RES., 75k, 0402, 1%
16	1	R15	Any	0402	RES., 200k, 0402, 1%
17	1	R21	Any	0402	RES., 187k, 0402, 1%
18	1	R23	Any	0402	RES., 3.65k, 0402, 1%
19	1	R25A	Any	0402	RES., 63.4k, 0402, 1%
20	1	R25B	Any	0402	RES., 49.9k, 0402, 1%
21	4	U1,U2,U4,U5	MPS, MPM3833CGRH	QFN-18	6V, 3A, POWER MODULE
22	1	U3	MPS, MPM3685GQN-7	QFN-28	16V, 8A POWER MODULE
23	1	JP5	Any	Through-hole	HEADER, 3 PINS

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ITEM	QTY	DESIGNATOR	MANUFACTURER/PART NUMBER	CASE	DESCRIPTION
24	1	J1	Samtec, ERM8-035-08.0-L-DV-K-TR	SMT	SIGNAL SOCKET
25	2	J2,J3	Samtec, IPBS-105-01-T-D	Through-hole	POWER SOCKET
OPTIONAL COMPONENTS					
1	14	C21A,C23A,C61,C71,C91,C81,C101A,C101B,C63,C73,C93,C83,C103A,C103B,C113	DNP		CAP., OPTIONAL
2	14	RJ31,RJ41,R91,RJ51,R71,R81,RJ33,RJ43,R93,RJ53,R43,R73,R83,R_EN	DNP		RES., OPTIONAL
3	2	U31,U11	DNP		LDO, OPTIONAL

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