
SERUB-16OVT EVM User's Guide

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1. DESCRIPTION

The SERUB-16OVT only the Serializer board based on the SERDESUB-16OVT kit. The SERUB-16OVT is an evaluation kit designed to demonstrate performance and capabilities of the DS90UB901Q and DS90UB902Q FPD-Link III Serializer/Deserializer Chipset for use with the OmniVision sensors. This serves as an add-on to the OmniVision development systems by providing a serialized digital interface between camera and controller. The chipset enables transmission of a high-speed video data along with a low latency bi-directional control bus simultaneously over a single twisted pair cable. The bidirectional control channel of the DS90UB901Q/902Q provides seamless communication between the camera and Host Controller.

The Serializer board provides LVCMOS inputs and a bidirectional control channel (I²C compatible) from the Image Sensor and is converted to a FPD-Link III LVDS data pair on the DS90UB901Q Tx board. The DS90UB902Q Rx board receives the FPD-Link III LVDS serialized data stream and converts it back into parallel LVCMOS signals and clock together with the bidirectional control channel (I²C). The Host Controller processes the video data from the image sensor and shows it on a display.

This manual is intended for developers who want a convenient way to begin system development. It is assumed that the reader has a basic understanding of digital video and still capturing concepts.

2. KIT CONTENTS

- o One SERUB-16OVT Serializer Board with the DS90UB901Q

3. SYSTEM REQUIREMENTS

The following items are required in order to use the SERUB-16OVT kit:

- o One SERDESUB-16OVT Deserializer Board with the DS90UB902Q Deserializer or equivalent
- o OmniVision camera sensor module
 - OV10620, OV7710, OV9715
- o Host Controller with I²C interface bus (I²C master)
 - FPGA, Electronic Control Unit (ECU), Video Processor, Microcontroller
 - Slave clock stretching must be supported by the I²C master controller
- o CAT6 cable
- o External +5VDC 1A Power Supply

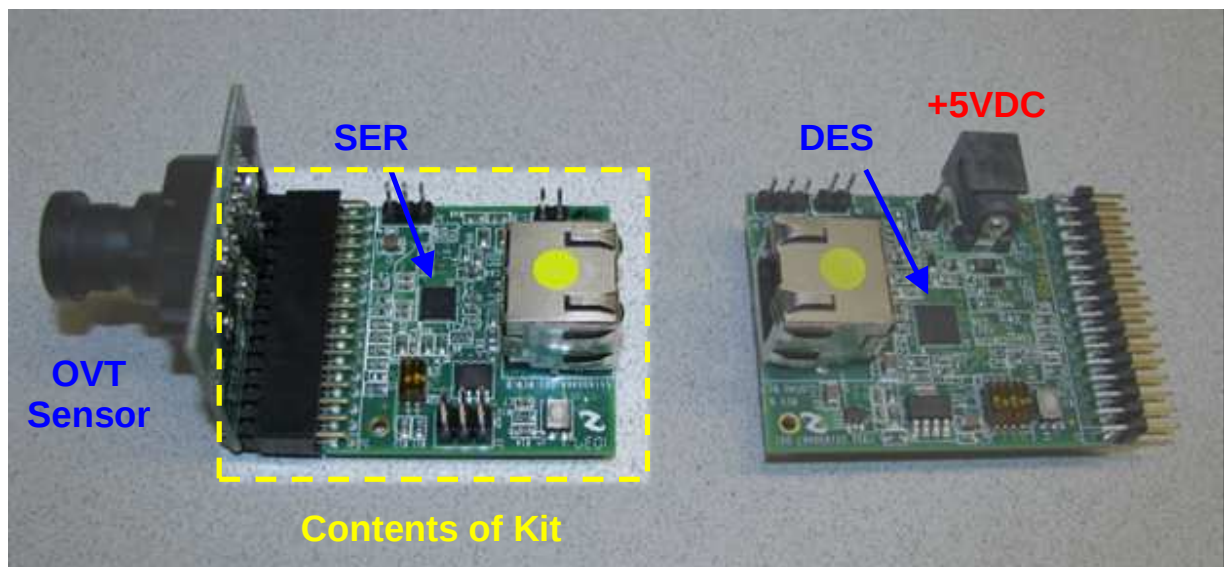


Figure 1: Imager Sensor – Serializer and Deserializer Board Connections

4. SETUP INSTRUCTIONS

1. Connect the DS90UB901Q Serializer board to the Omnivision module via the J1 32-pin header (16 x 2 x 0.1"). Ensure that the camera module and the Serializer board are connected properly by matching the ground (GND) pins.
2. Connect the DS90UB902Q Deserializer board to the Host Controller.
3. Connect the DS90UB901Q Serializer board to the DS90UB902Q Deserializer board via CAT6 cable on the RJ45 connectors.
4. Apply 5V power supply to the Deserializer board J10 power jack.
5. Push "ON" button (S4) on Deserializer board. Green light should now be visible on RJ45 connectors at Serializer (J4) board and Deserializer (J7) board to indicate power is applied to the boards.
6. Initialize the Deserializer. Refer to the DS90UB901Q/902Q datasheet for startup procedure and the definition of each register.
7. Verify that LOCK LED on D5 and the RJ45 orange lights are lit. This indicates the chipset is Locked and ready to begin I²C communication with the image sensor.
8. Initialize the OmniVision image sensor. Refer to the appropriate sensor datasheet for specific information.
9. Start video capture (or alternate control application).

5. BLOCK DIAGRAMS

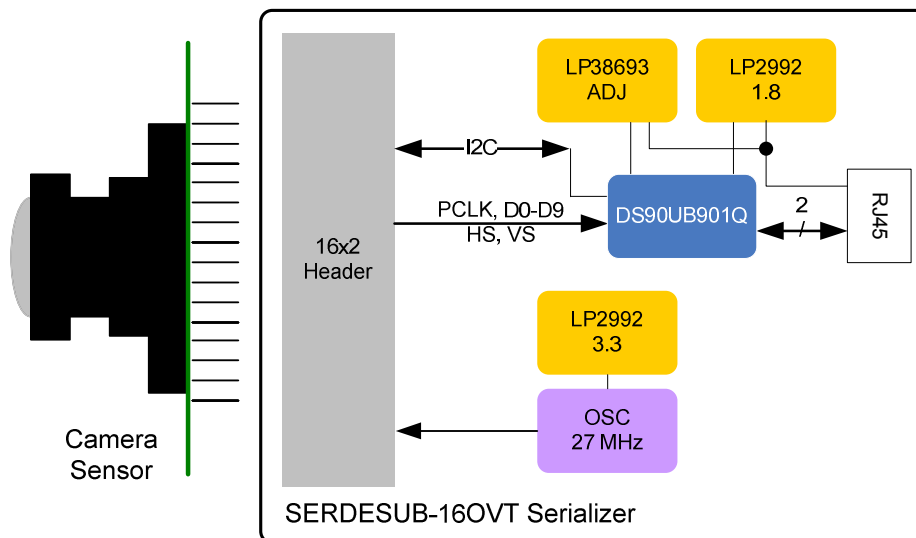


Figure 2. Serializer Board Block Diagram

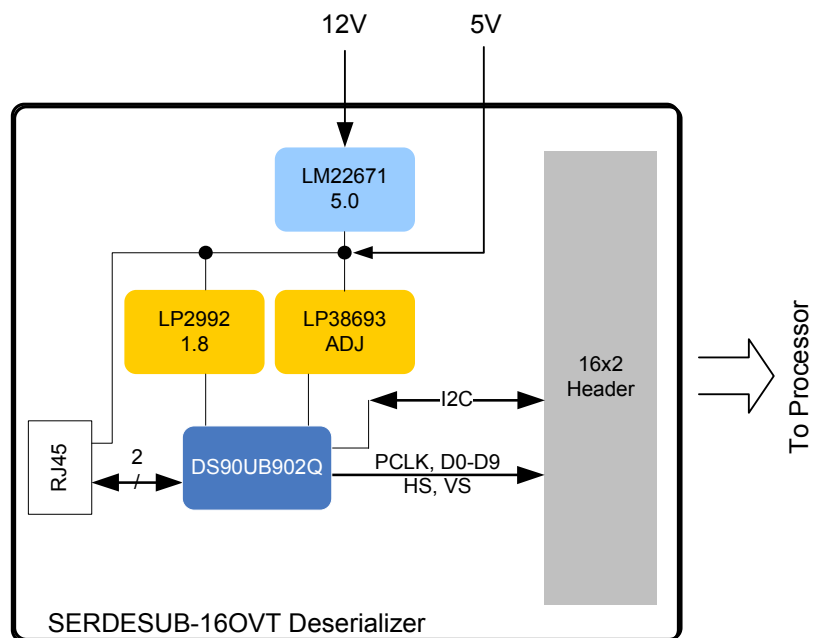


Figure 3. Deserializer Board Block Diagram

6. OPERATION

This section describes how to I²C instructions between Host and image sensor through the DS90UB902Q and DS90UB901Q pair function in a camera system application. Figure 4 shows the configuration of evaluation boards for I²C communication with a Host controller. Note a Host controller requires an I²C interface with slave clock stretching support.

In Camera mode, I²C transactions originate from the Master controller at the Deserializer side (Figure 4). The I²C slave core in the Deserializer will detect if a transaction is intended for the Serializer or the camera sensor (slave device) at the Serializer. Commands are sent over the bidirectional control channel to initiate the transactions. The Serializer will receive the command and generate an I²C transaction on its local I²C bus. At the same time, the Serializer will capture the response on the I²C bus and return the response on the high speed forward channel. The Deserializer parses the response and passes the appropriate response onto the Deserializer I²C bus.

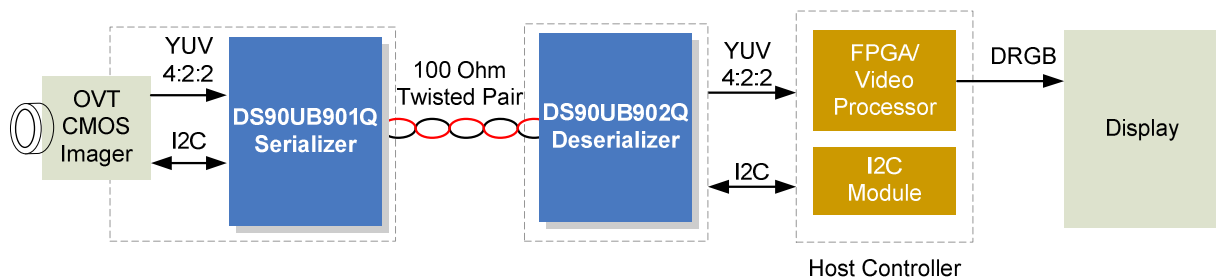


Figure 4. Typical System Block Diagram

TROUBLESHOOTING CHART

Problem...	Solution...
No image	Check that RJ45 green lights are on
No green light on RJ45 connectors	Check that 5V power supply is applied, and CAT cable connection is good Cycle "ON" button on Deserializer board
All lights on, but no image	Check that orientation of board connections is correct
No image	Check that lens cap is removed from camera
Power, ground, input data and input clock are connected correctly, but no outputs.	Check the Power Down pins of both Serializer and Deserializer boards to make sure that the devices are enabled (PDB=Vdd) for operation.

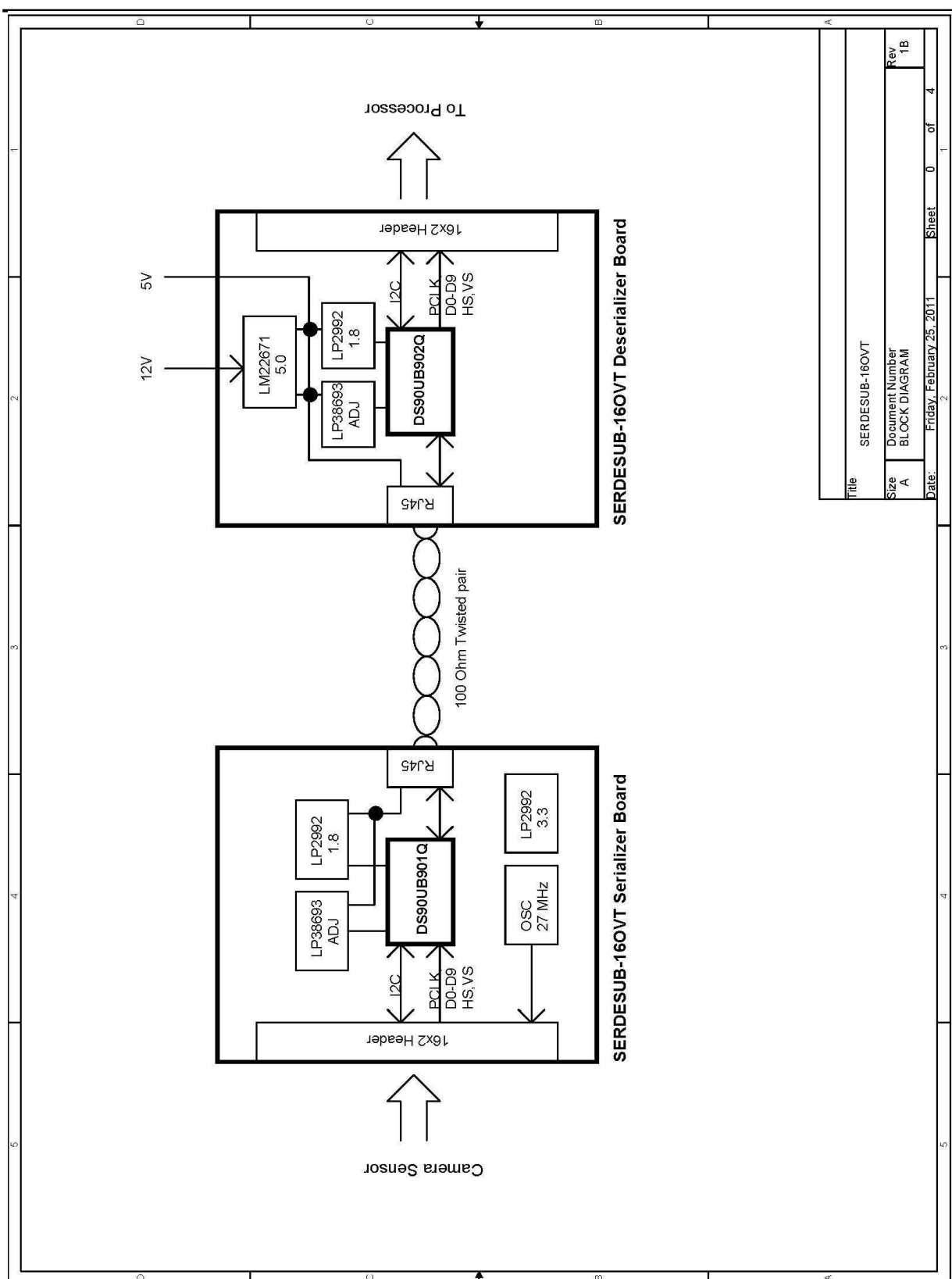
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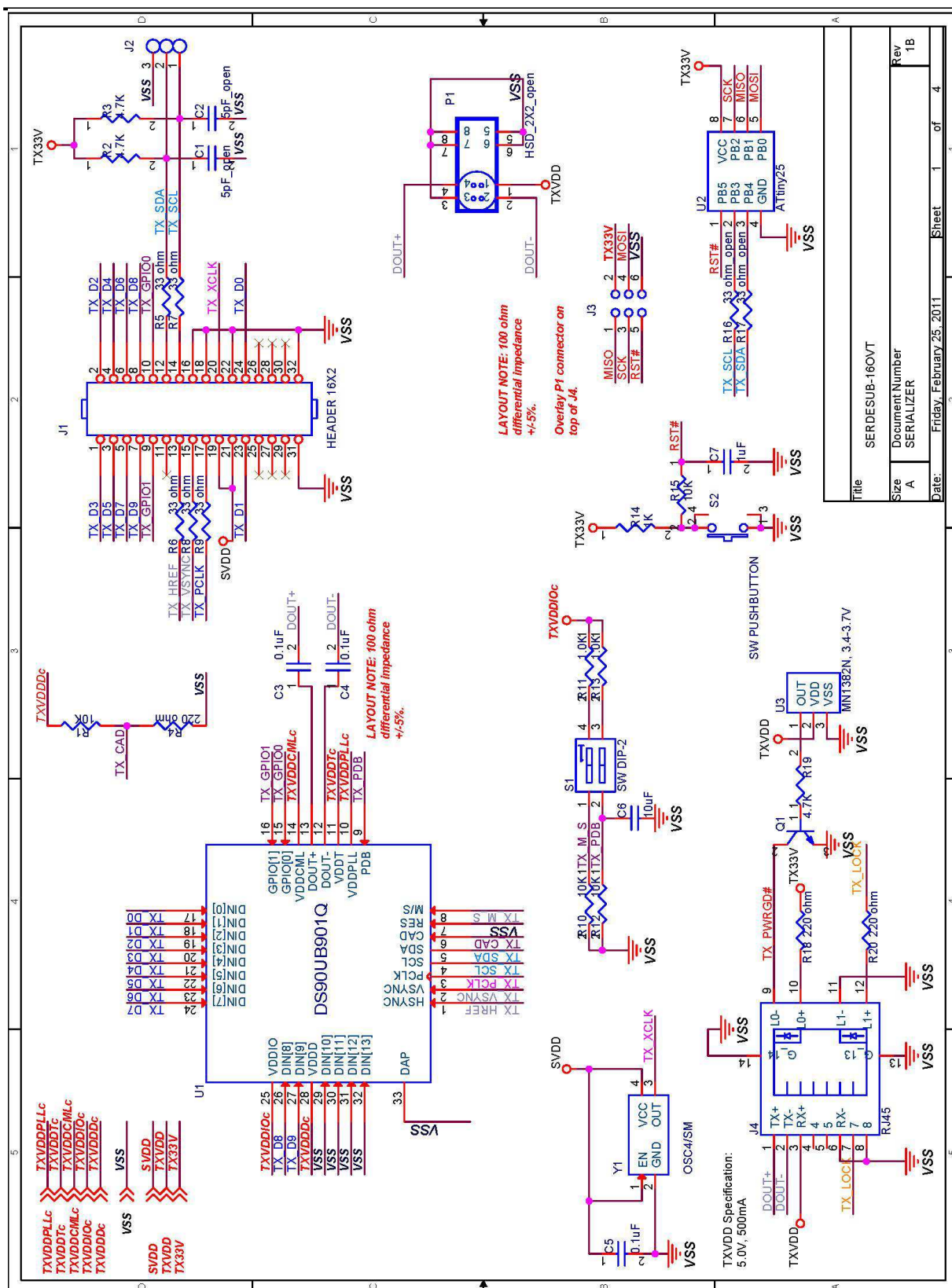
Item	Quantity	Reference	Part	PCB Footprint
1	1	C1	5pF_open	CAP_HDC_0603
2	1	C2	5pF_open	CAP_HDC_0603
3	5	C3,C4,C5,C28,C29	0.1uF	CAP_HDC_0603
4	2	C6,C30	10uF	CAP_HDC_0603
5	3	C7,C35,C52	1uF	CAP_HDC_0603
6	9	C8,C16,C18,C57,C59,C70, C72,C73,C75	10uF	CAP_HDC_1206
7	1	C9	10uF	CAP_HDC_1206
8	14	C10,C11,C13,C19,C20,C22, C24,C31,C32,C36,C38,C43, C47,C60	0.01uF	CAP_HDC_0603
9	25	C12,C14,C15,C17,C21,C23, C25,C33,C37,C39,C44,C45, C46,C48,C51,C53,C55,C56, C58,C61,C63,C64,C69,C71, C74	0.1uF	CAP_HDC_0603
10	2	C26,C27	100pF	CAP_HDC_0603
11	1	C34	22uF	805
12	1	C40	22uF	Radial_Surface_Mount
13	1	C41	0.1uF	CAP_0603
14	1	C42	1uF	CAP_HDC_0805
15	1	C49	100uF	3216_12_EIA_1206
16	1	C50	0.01uF	CAP_HDC_0603
17	2	C54,C62	10uF	CAP_HDC_0805
18	4	C65,C66,C67,C68	4.7uF	CAP_HDC_0805
19	1	D1	Green_LED,0603	603
20	1	D2	DIODE SCHOTTKY	SC_90_SOD_323F
21	2	D3,D4	DIODE SCHOTTKY	S_Mini_2P
22	1	D5	Orange_LED,0603	603
23	1	J1	HEADER 16X2	Through_Hole_Right_Angle
24	2	J2,J6	IDC1X3	Header_1X3P
25	1	J3	2x3-Pin Header	Header_2X3P
26	2	J4,J7	RJ45	RJ45_LED
27	1	J5	HEADER 16X2	hdr_100mil_16X2
28	3	J8,J9,J11	CON2	CON2
29	1	J10	CONN JACK PWR	3_terminal_thru_hole_power_jack
30	1	L1	39uH	Surface_Mount_
31	1	L2	100uH	100uH
32	11	L3,L4,L5,L6,L7,L8,L9,L10, L11,L12,L13	FB 1000 Ohm,0402	RES_HDC-0402
33	1	P1	HSD_2X2_open	CON_HSD-4P_1
34	1	P2	HSD_2X2_open	CON_HSD-4P
35	2	Q1,Q2	MN1382N	SC_75
36	1	Q3	PMOSFET	PMOSFET

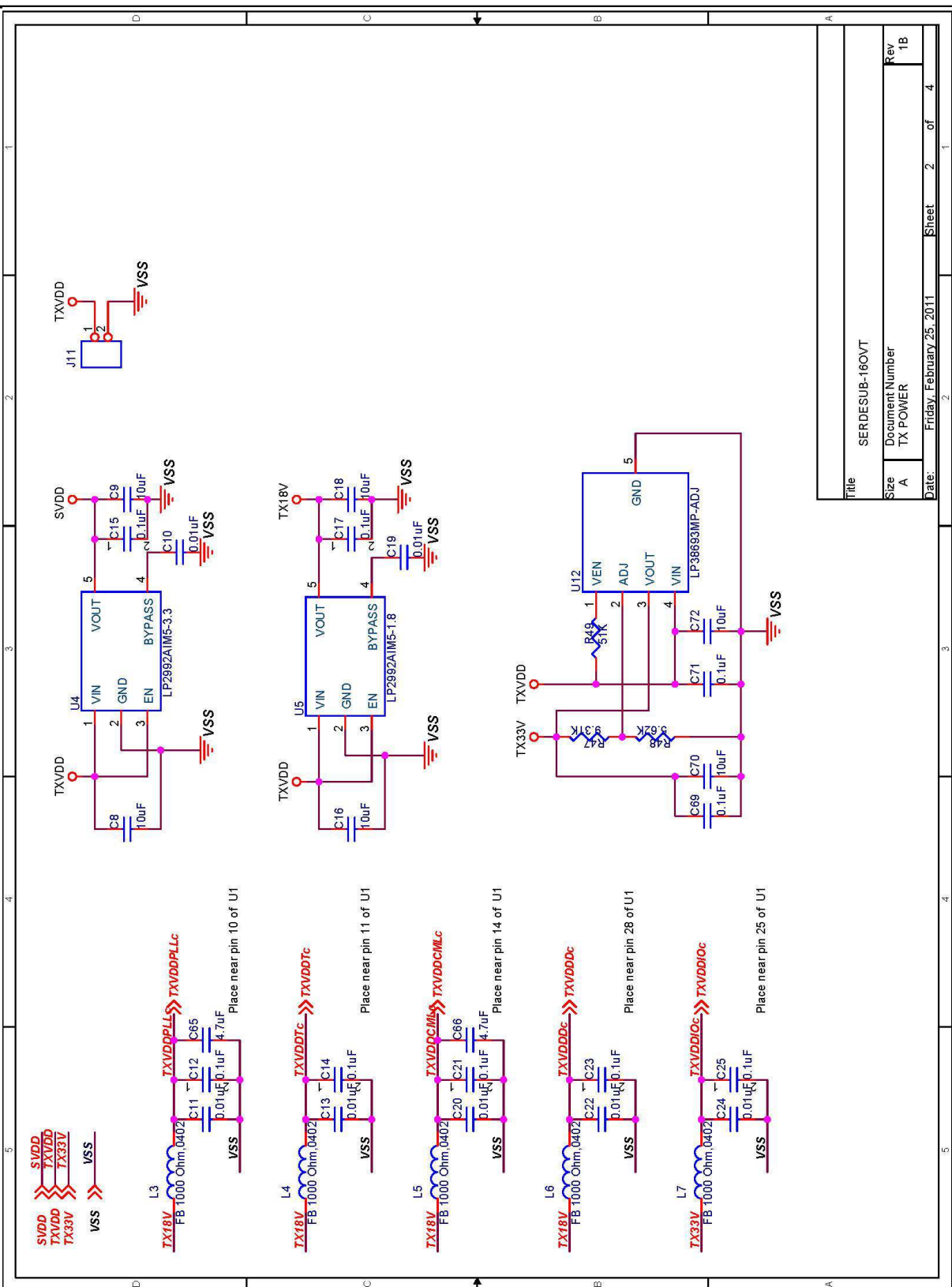
Item	Quantity	Reference	Part	PCB Footprint
37	9	R1,R10,R12,R15,R32,R33, R35,R37,R46	10K	RES_0603
38	4	R2,R3,R19,R29	4.7K	RES_0603
39	6	R4,R18,R20,R28,R31,R41	220 ohm	RES_0603
40	9	R5,R7,R8,R9,R23,R24,R25, R26,R27	33 ohm	RES_0603
41	1	R6	33 ohm	RES_0603
42	5	R11,R13,R34,R36,R38	1.0K	RES_0603
43	1	R14	1K	RES_0603
44	2	R16,R17	33 ohm_open	RES_0603
45	2	R21,R22	1.8K	RES_0603
46	2	R30,R54	75 ohm,0603	RES_0603
47	1	R39	0 Ohm	RES_HDC_0603
48	1	R40	1.0K_open	RES_0603
49	1	R42	0ohm	RES_HDC_0603
50	1	R43	976_open	RES_HDC_0603
51	1	R44	10K	RES_HDC_0402
52	1	R45	470K	RES_HDC_060
53	2	R47,R51	9.31K	RES_HDC_0603
54	2	R48,R52	5.62K	RES_HDC_0603
55	2	R49,R53	51K	RES_HDC_0603
56	1	R50	0ohm_open	RES_HDC_0603
57	2	R58,R59	0 ohm_open	RES_0402
58	1	S1	SW DIP-2	Surface_Mount
59	2	S2,S4	SW PUSHBUTTON	SPST_NO
60	1	S3	SW DIP-4	CT2184LPST
61	1	U1	DS90UB901Q	32ld_LL
62	1	U2	ATtiny25	8_SOIC
63	2	U3,U7	MN1382N, 3.4-3.7V	Mini_3P
64	1	U4	LP2992AIM5-3.3	SOT_23_5
65	2	U5,U11	LP2992AIM5-1.8	SOT_23_5
66	1	U6	DS90UB902Q	40ld_LL
67	1	U8	LM22671MRE-5.0	8_PSOP
68	1	U9	NC7SZ14/SOT23	SC70_5
69	1	U10	NC7SZ74	US8_8_VSSOP
70	2	U12,U13	LP38693MP-ADJ	SOT223-4
71	1	Y1	OSC4/SM	4_PIN_SMT

8. APPENDIX

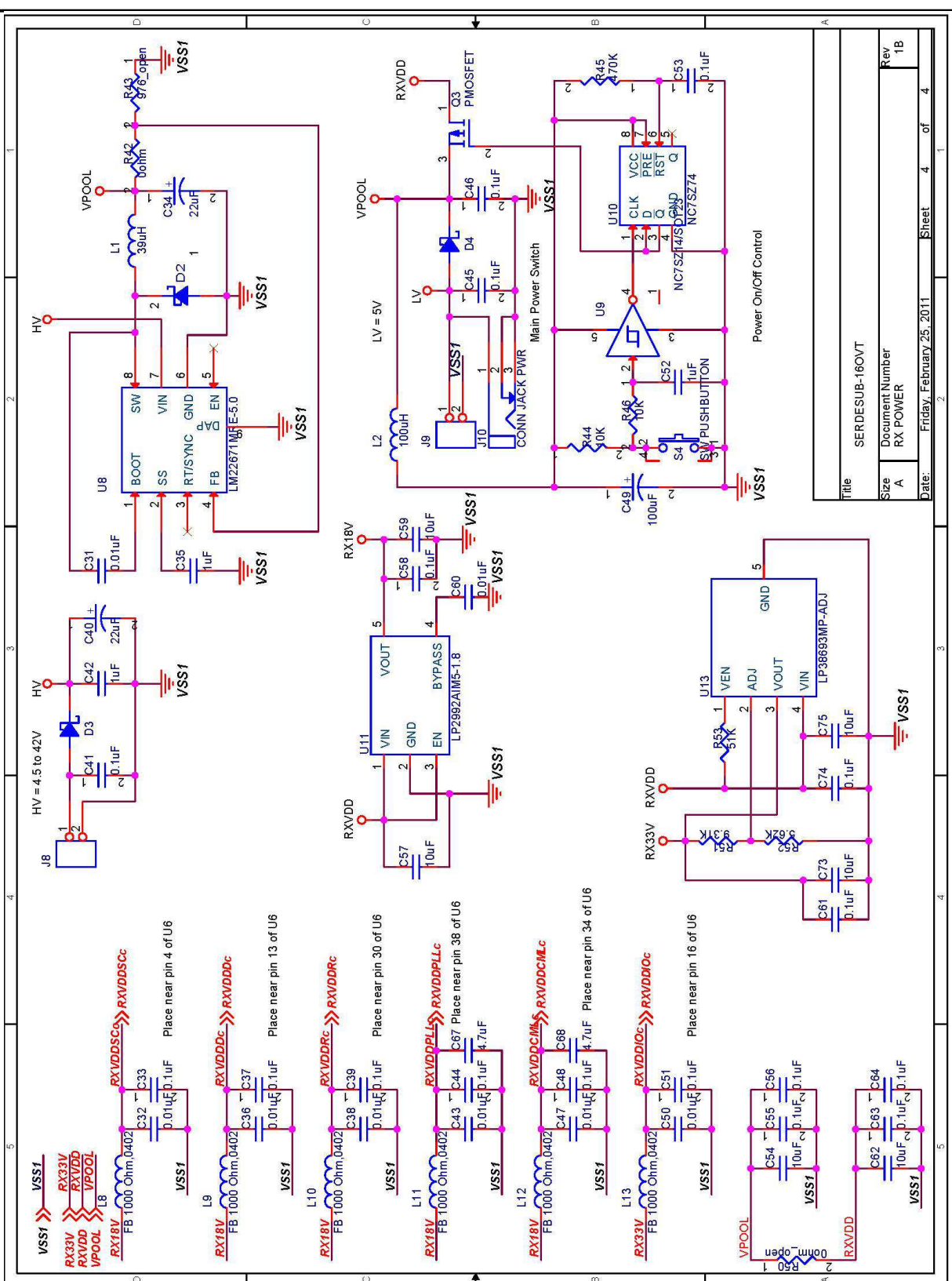
Serializer and Deserializer PCB Schematics











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