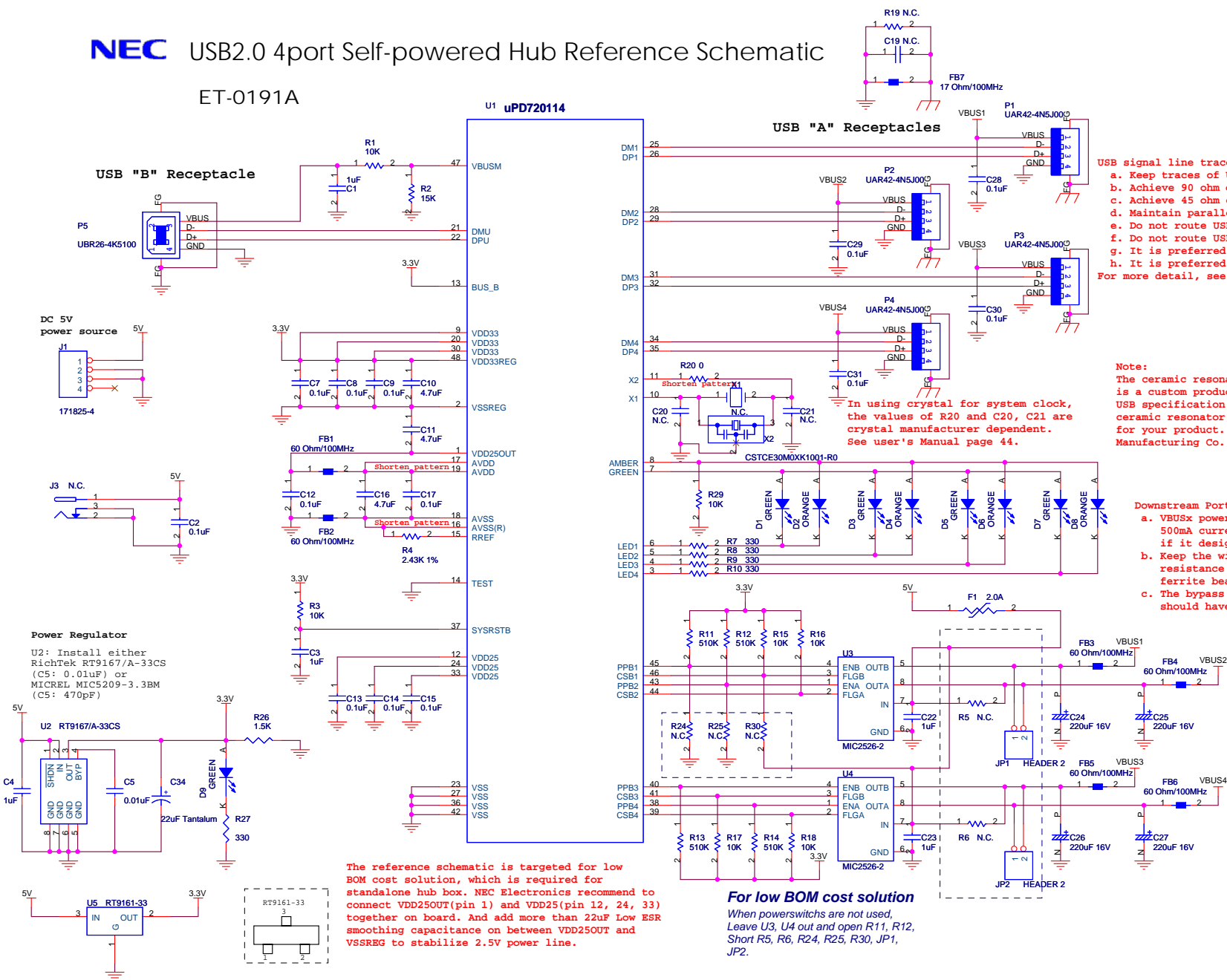


# NEC USB2.0 4port Self-powered Hub Reference Schematic

ET-0191A



**USB signal line trace:**

- Keep traces of USB bus D+ and D- in the same length.
- Achieve 90 ohm differential characteristic impedance.
- Achieve 45 ohm common characteristic impedance.
- Maintain parallelism between D+ and D-.
- Do not route USB2.0 D+ and D- over the power plane split.
- Do not route USB2.0 D+ and D- over the other high frequency signals.
- It is preferred to route USB2.0 D+ and D- over ground layer.
- It is preferred to route USB2.0 D+ and D- using single layer.

For more detail, see design guideline in design kit.

**Note:**  
The ceramic resonator Y2, CSTCE30M0XK1001, is a custom product for ET-0191A board to meet USB specification. In using this type of ceramic resonator, it should be customized for your product. Contact directly to MURATA Manufacturing Co., Ltd. to make your customer order.

**Downstream Port Power Supply:**

- VBUSx power line(pattern) should have at least 500mA current load strength on each downstream port if it design with self-powered hub.
- Keep the width of VBUSx pattern, use low power on resistance of power switch and use low resistance of ferrite beads to avoid voltage drop.
- The bypass capacitance of C24, C25, C26 and C27 should have at least of 120uF and low ESR.

The reference schematic is targeted for low BOM cost solution, which is required for standalone hub box. NEC Electronics recommend to connect VDD25OUT(pin 1) and VDD25(pin 12, 24, 33) together on board. And add more than 22uF Low ESR smoothing capacitance on between VDD25OUT and VSSREG to stabilize 2.5V power line.

**For low BOM cost solution**  
When powerswitches are not used, Leave U3, U4 out and open R11, R12, Short R5, R6, R24, R25, R30, JP1, JP2.

**\*All resistors are 5% tolerance unless specified otherwise**

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<b>NEC Electronics Corporation</b>			
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