Technical report 015-RXQ-001 On 15.09 MHz four channel phased array coil for spine imaging

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On 15.09 MHz four channel phased array coil for spine imaging

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This technical report includes:

- description of the coil (page 2)
- schematics of the coil components (Fig. 2…6)
- photos of the coil components (Fig. 2…7)

The sensitive elements of the spine coil are butterfly (figure eight) resonators. There are eight square resonators each 14 cm X 14 cm oriented and overlapped in a way to achieve isolation between them better than 20 dB. Each channel consists of two identical “butterlies” turned 90 degrees around a central point to achieve a quadrature pair. Capacitive π matching networks are employed to connect resonators to quadrature hybrids. Outputs of each pair are combined in a quadrature hybrid and then amplified by 36 dB in a Miteq AU-1114 preamplifier.

Active switching is provided through eight DC lines. DC voltage of 5 V and current more than 0.1 A are required to switch the coil off during transmission.

Coil width is 500 mm, thickness (without foam padding) – 32 mm, total length – 1000 mm. Navy blue tape on the coil sides indicates an imaging area.

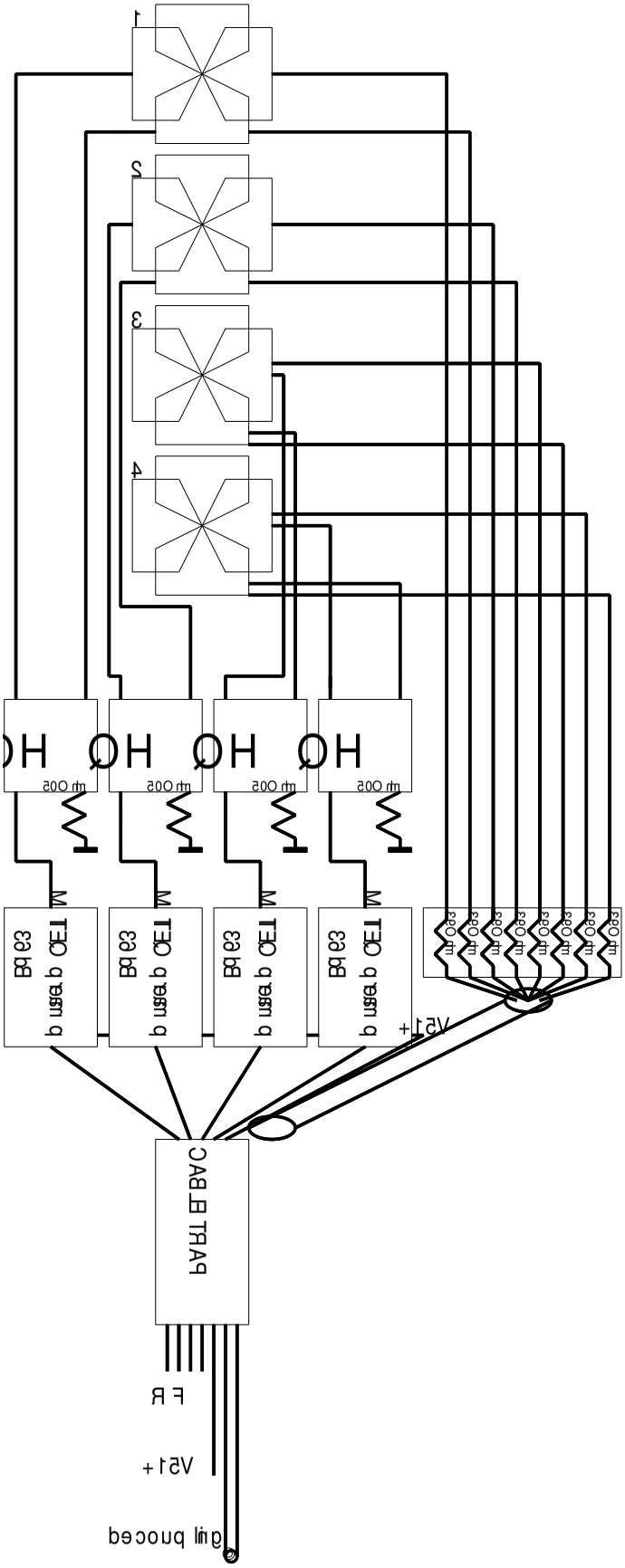
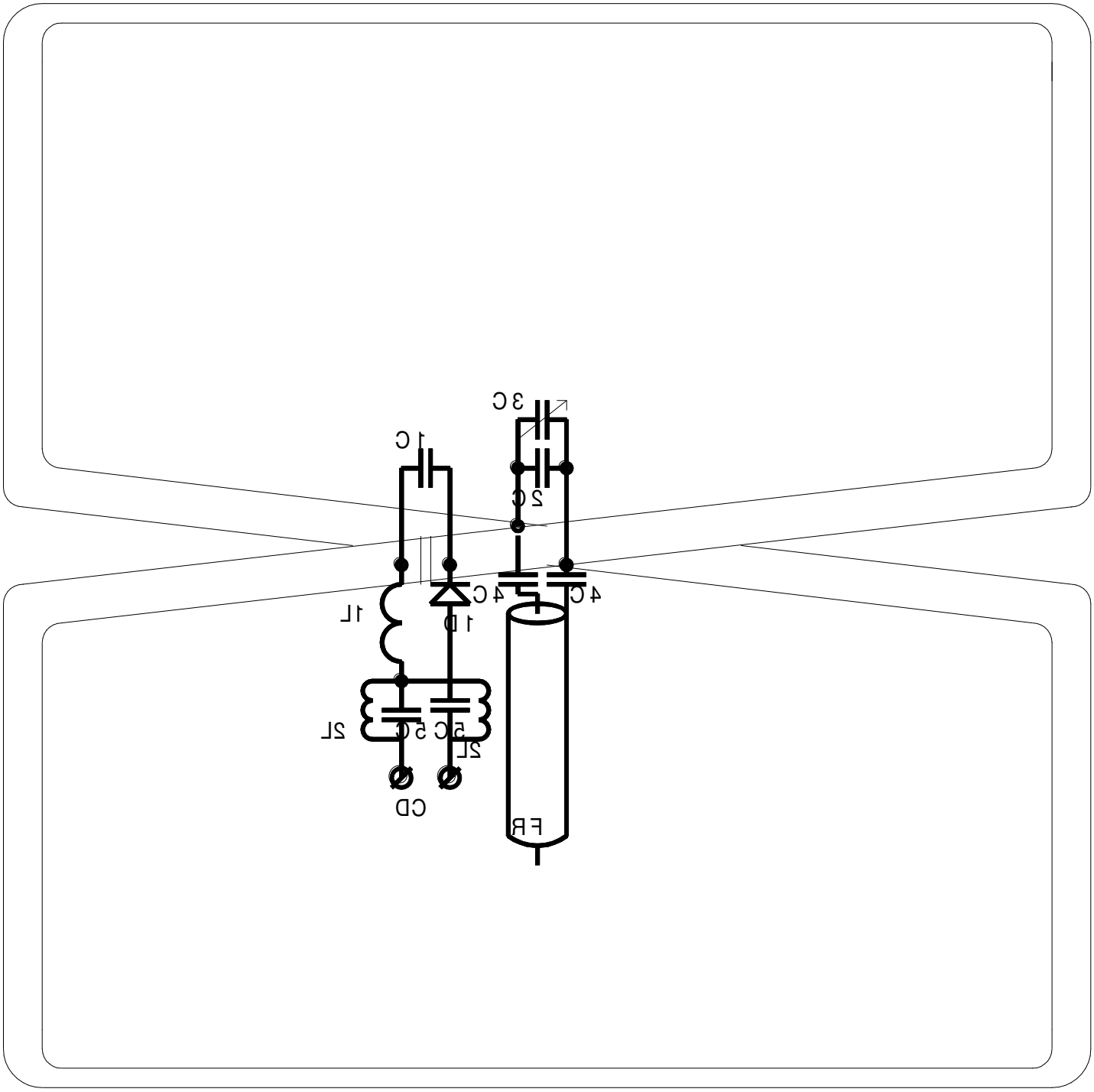


Fig.1. Block diagram of the spine coil.



C1: 360 pF 200 VDC; C2: 330 pF 200 VDC; C3: 10..40 pF 50 VDC; C4: 62 pF 500 VDC; C5: 120 pF 300 VDC; L1: 310 nH; L2: 1 μH; D1: UM9415; R1: 150 Ohm, R2: 1300 Ohm.

Fig.2A. Schematics of the single resonator.

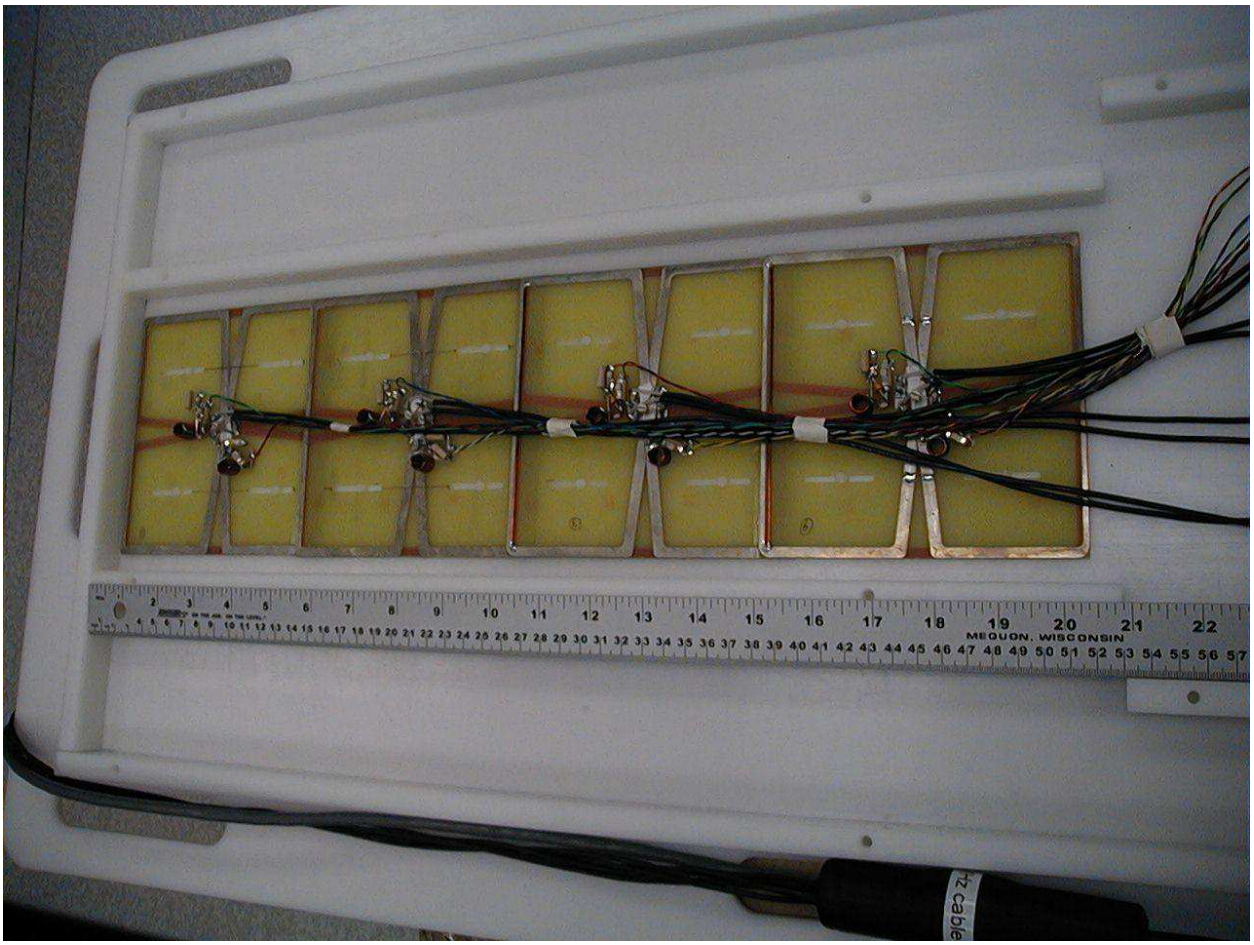
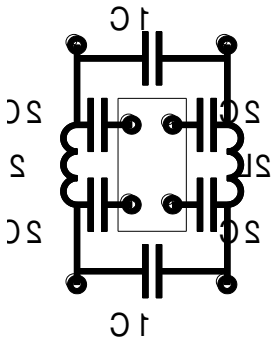


Fig.2B. Pictures of the resonators.



C1: 220 pF 200 VDC; C2: 100 pF 300 VDC; L1: 400 nH.

Fig.3A. Schematics of the quadrature hybrid.

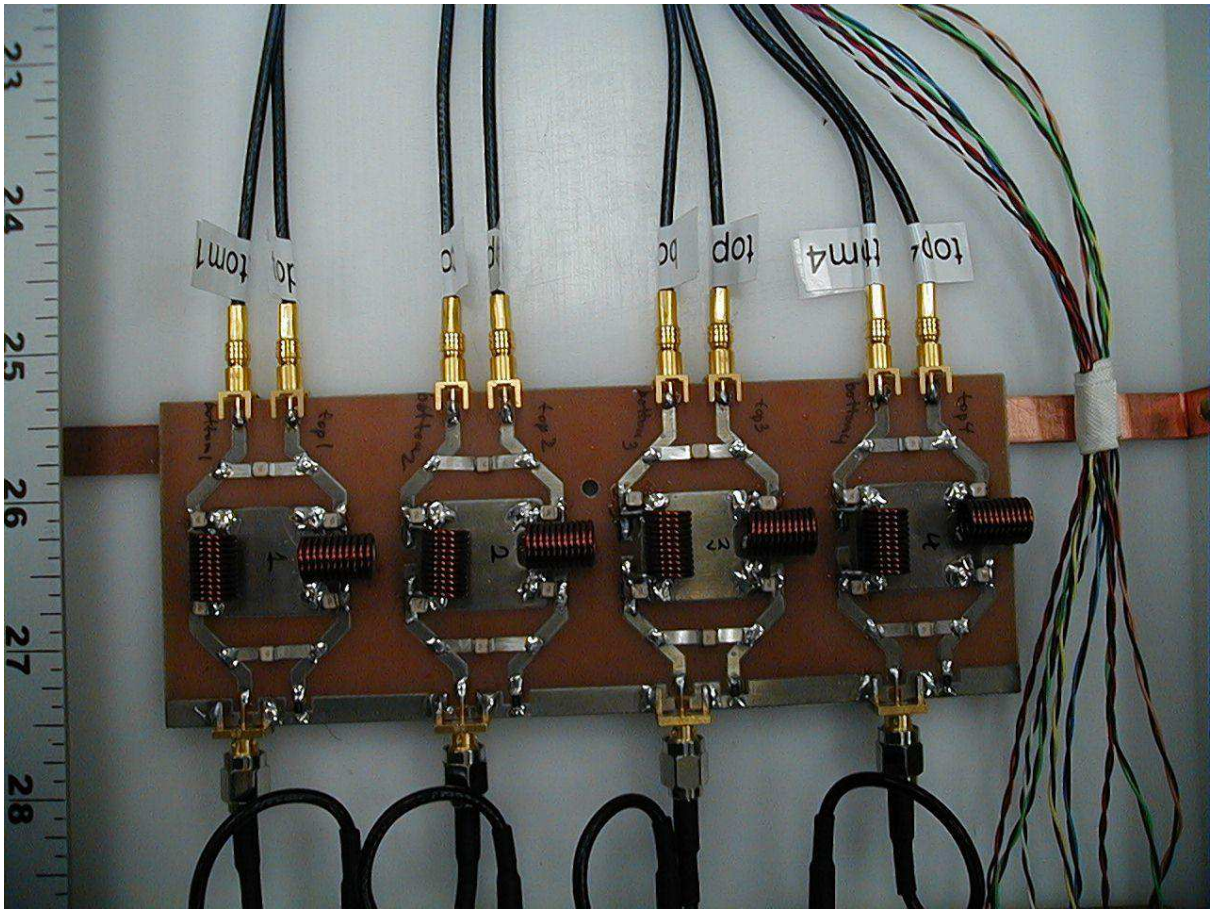


Fig.3A. Picture of the quadrature hybrids.

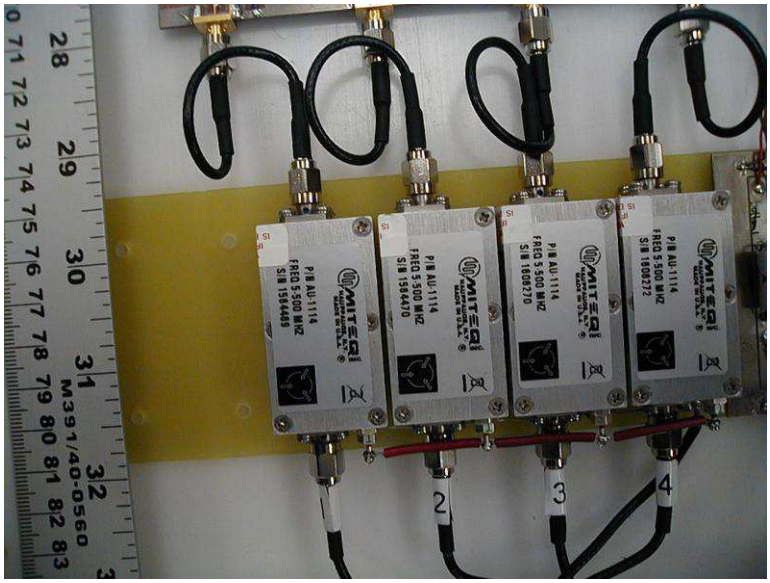


Fig.4. Picture of the preamplifiers.

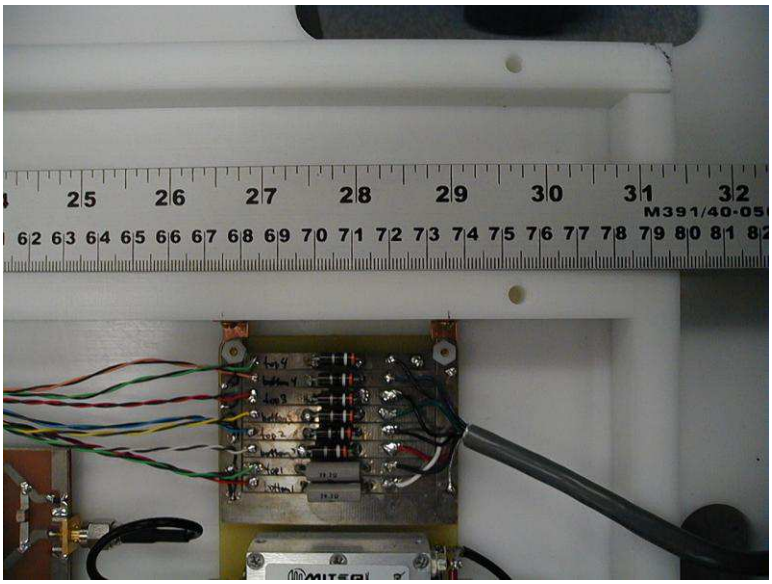


Fig.5. Picture of the current limiting resistors.

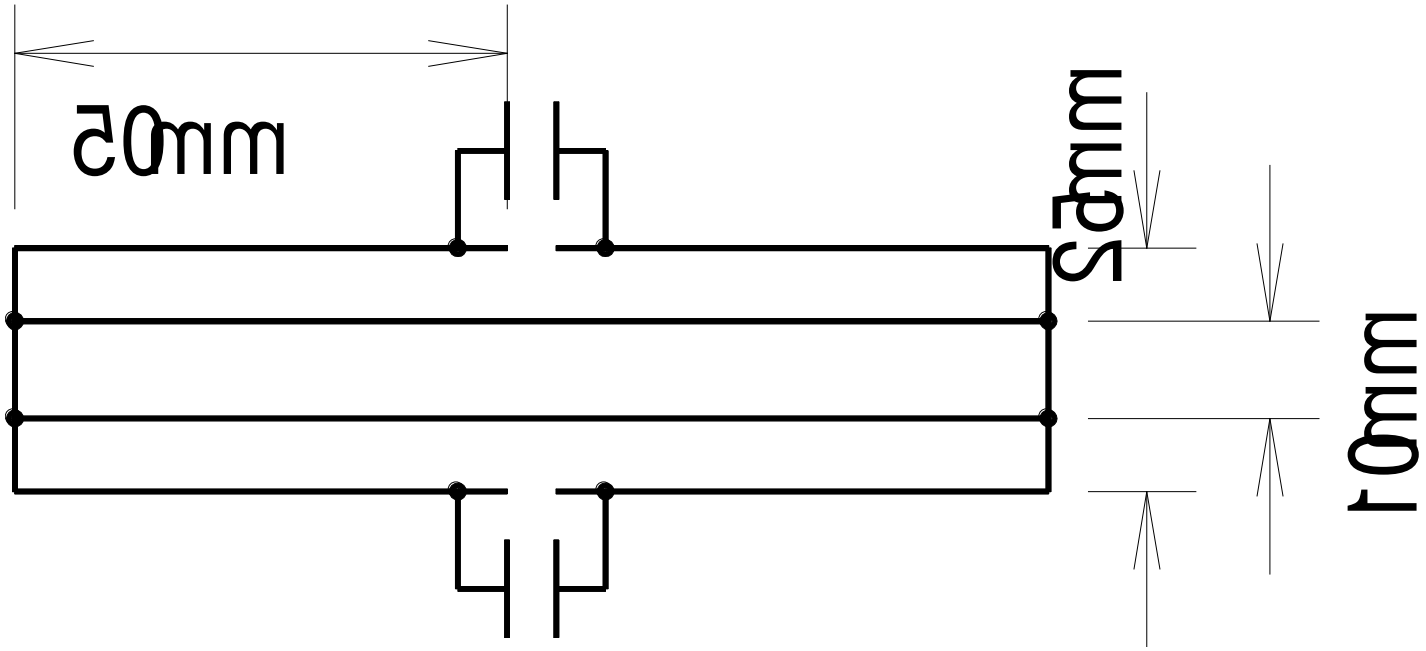


Fig.6A. Schematics of the cable trap, total capacitance is 6910 pF.

Fig.6B. Picture of the cable trap.

Fig.7. Picture of the coil.