Specifications

of the antenna amplifier

RLA3C/ 4D - H

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Amplifier dimensions (W x H x D) :	97 mm x 50 mm x 15 mm (3C/4D incl. connection sockets), 83 mm x 50 mm x 6 mm (board 4E - G)
Frequency range:	30 kHz … 54 MHz, damping at 90 MHz about 20 dB (3C/4D) 20 kHz … 71 MHz, damping at 90 MHz about 25 dB (4E/F/G)
Average noise level (without loop):	3C/4F: -135 dBm/Hz, 4D/E/G: -142 dBm/Hz @ 10 MHz
IP3:	>= 3C/4F: +26 dBm, 4D/E/G: +30 dBm (2x -6 dBm bei 10 MHz)
IP2:	>= 3C/4F: +70 dBm, 4D/E/F: +76 dBm (10.0 MHz + 10.2 MHz, -6 dBm, 0.2 MHz measured difference tone)
Max. permitted input voltage:	0.2 Veff constant, ±10 Vpeak 1 ms
Output voltage:	>= 3C: 0.8 Veff, 4D/E/F/G: 1.5 Veff, @1 dB compression
Supply via DC jack / cable:	+6.0 V … +13.8 V, **maximum +14.4 V!**
Power consumption per amplifier:	3C: 37 mA ±5 mA, 4D/E/F/G: 40 - 90 mA depending on control
HF output:	50 ohm, connection via coaxial cable or matching jacket
Environmental conditions:	-20 ... +70 °C ambient temperature, up to 99 % rel. humidity non-condensing, outdoor application in closed case
Compliance:	CE according to DIN EN 55013, EN 55020, EN 60065 RoHS / WEEE directive, ear reg. nr. 27676700

Specifications are subject to change!

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Safety information

Please always observe the following safety instructions!

Never connect the device to any other voltage than indicated in the specifications. Under no circumstances should the the device come into contact with the mains voltage of 230 V ~!

If you use the device outdoors, please observe the lightning protection regulations for the outdoor operation of electrotechnical systems!

Observe the permitted temperature range for starting up the device! Do not switch the device on or off again if this range is exceeded or fallen below!

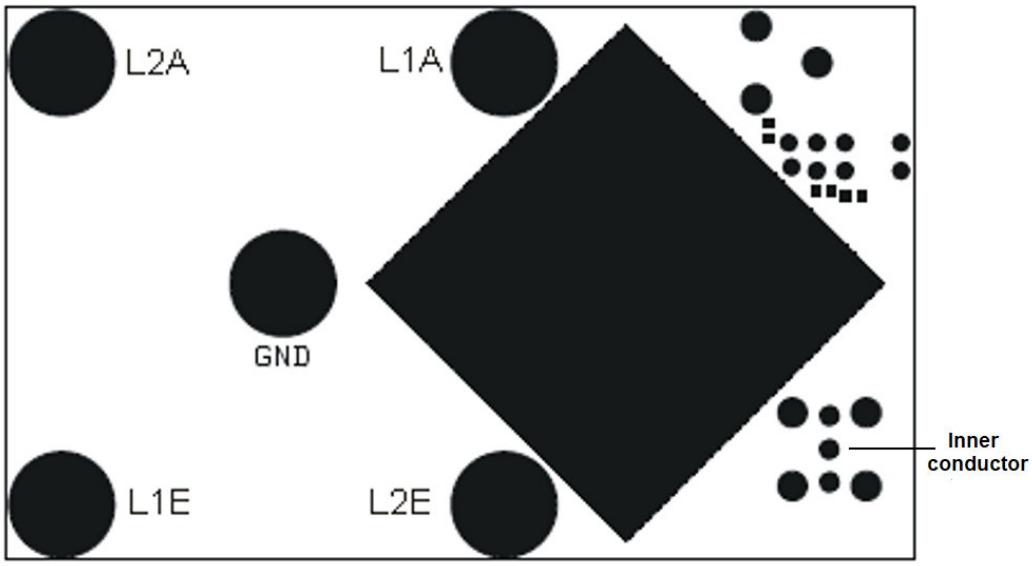
If you notice any damage to the device, immediately take it out of operation (remove power supply)! If necessary, return it to the supplier for repair.

If you wish to dispose of the device due to damage or because you do not use it anymore, return it to the supplier or to your local waste collection center. Never dispose of the device in any other way, for example, with your household waste!

In case of mechanical assemblies, please note that no bending or torsional stresses are transmitted to the PCB! Mounting material (nuts, screws, etc.) may only be tightened with a force that prevents damage to the surface!

Operator's Manual

The RLA3C and 4D - G boards are intended as antenna amplifiers for magnetic loop antennas. They contain 2 switchable amplifiers for each receiving loop. The amplifier inputs are low impedance (about 1 ... 25 ohms, depending on the frequency range) and thus optimized for single-turn loops with diameters of about 20 ... 100 cm. The HF output voltage is delivered with 50 ohm impedance. This connection is also used for the power supply ("remote supply"). A coaxial cable can be connected to the inner conductor at the midpoint of the female connector and to the shield at any adjacent hole (all GND). In addition, a DC hollow pin socket and a switch for local supply and switching of the amplifiers can be fitted on the board (interior version).



The two receiving loops must be routed with their ends to holes L1A - L1E (first loop) or L2A - L2E (second loop). The holes are 4.3 mm in size and thus allow connection by means of M4 screws. To protect the printed circuit board, it is essential to place shims!

Caution! The amplifier needs a certain minimum impedance at the input to operate correctly! In the event of a short circuit (very small loops with low inductance) of the inputs against each other or against GND, the gain becomes so high that the amplifier becomes unstable and oscillates at high frequencies. This can be recognized by increased power consumption and strong noise in the received signal.

For proper function, the connections of the loops must be connected to ground with low impedance! Current flows from the inputs of the amplifiers to GND. Normally this is done by grounding the loop center to GND. Alternatively, direct current grounding must be performed by throttling (scale of 10 ... 50 µH) of Lxy against GND.

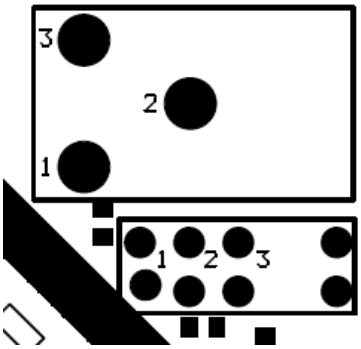
The GND hole (ground, ground connection) can be connected to a conductive housing into which the board should be installed for optimum reception. In addition, the center of the loop(s) must be connected here (e.g. via a metal rod or thick wire). This results in a grounding of the loop(s) against electrical interference and overvoltage.

The board is not protected against direct lightning strikes and may not be operated in lightning-prone environments without external protection!

In the case of version 3, the two antenna loops are switched by changing the supply voltage (at the HF connection) according to the following scheme:
- Voltage >= 9.0 V: Loop 2 is active (45°).
- Voltage = 8.0 V ±0,2 V: Loop 1 is active (135°).
- Voltage = 6.9 V ±0,2 V: both loops are active (0°).
- Voltage <= 6.2 V: both loops are active with polarity reversal loop 1 (90°).

Between the specified voltage ranges, the circuit is indeterminate (hysteresis).

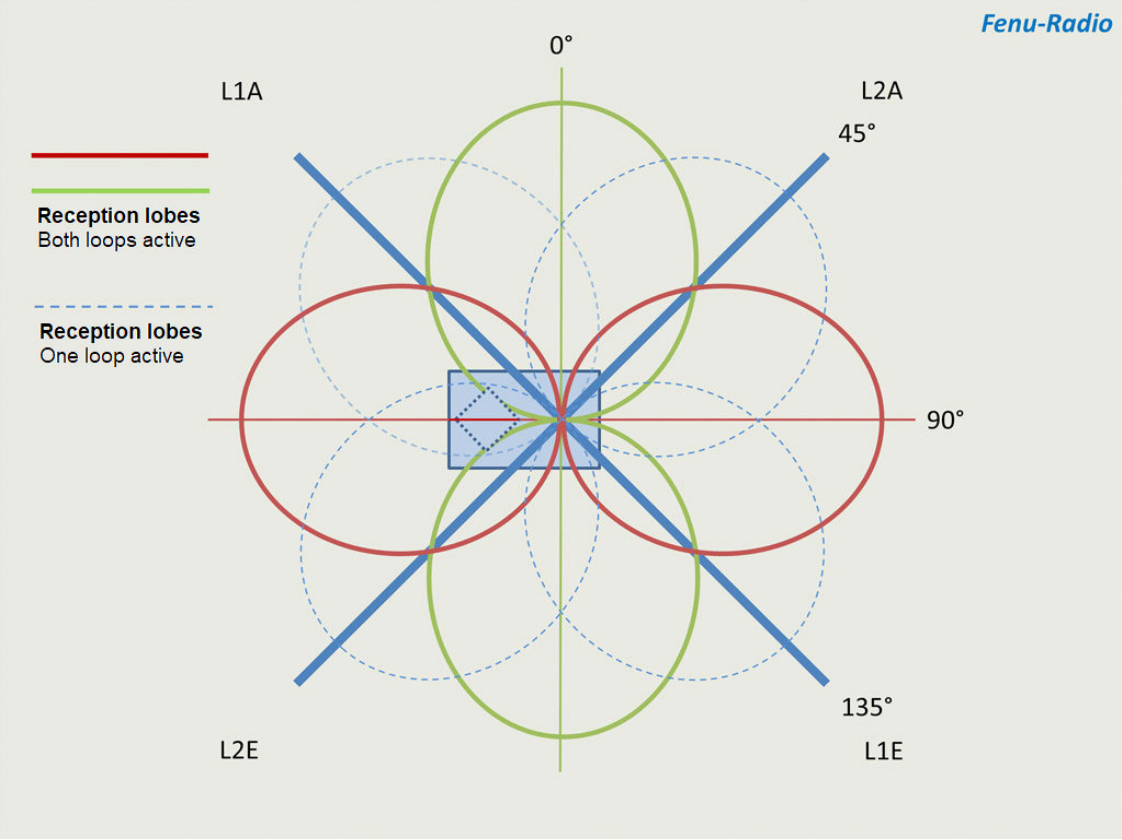
If the amplifier is not to be supplied via the HF cable, a direct DC supply can be established at the designated solder points of the DC socket and the changeover switch (both equipped only with the complete unit for "indoor version").



For this purpose, the negative pole must be connected to the ground connection of the socket (pin 2 or 3, top), the positive connection to pin 1 of the socket, or to pin 2 of the switch (bottom, if present). The above given voltages for the switching points of the amplifiers apply.

Caution! When fed via the HF cable, add approximately 0.3 V to each value to compensate for the loss through the cable and the DC splitter integrated in the amplifier (version 3C only)!

The main receiving direction of a loop always lies in the direction of the loop plane (bidirectional, "8" shape). When both loops are active, the main receiving direction lies between the loop planes (45° twisted to each loop). By reversing a loop, this direction can be switched by 90°. Together with the operation of only one loop, this results in a direction change in 45° steps. Switching can be done by means of an adjustable voltage source (e.g. laboratory power supply unit with feed switch) or a special control unit. The supply voltage should be free of interference and well stabilized!



As of version 4E, the loops are not only controlled by an analogue DC voltage, but also by digital modulation of the remote supply voltage (logically negative RS-232 signal (start bit = increased supply voltage, stop bits = supply voltage). In this case, a data word is sent from a control unit (modulator) to the antenna. This data word contains a command for setting the receiving direction. Depending on the version, different settings are possible:

4E:

The data format is 125 Baud 8N2 (8 data bits, no parity bit, 2 stop bits). The supply voltage switches as follows:

- Supply with > 10 V (observe permissible maximum!): The RLA4 only operates with loop 1.
- Supply with > 8 V and <= 10 V: The RLA4 only operates with loop 2.
- Supply with 6 V and modulation of an RS-232 signal with active level of min. 7 V and maximum 8 V: Directional control:

- Value 0 to 126: Loop operation by setting the receiving direction from 0° to 180° in 127 steps.
- Value 127 to 255: No reaction (reserved for further developments).

4F:

The version 4F is characterized by a special feature: When switched to "Whip mode", all loop connections including the mid-point connection are switched to high impedance. At the mid-point connection, the reception voltage is tapped by a FET amplifier and conducted with approx. 10 dB gain to the output. As a result, the antenna predominantly receives the electric field component ("active electrical antenna"). In the usual arrangement of loops with the center on top and connections at the bottom or vertical center rod results in omnidirectional reception. The reception power heavily depends on the installation site, the environment, grounding, supply and other factors. Usually, a good reception performance is only achieved with exposed installation sites (high altitude above ground and other objects).

The data format is 125 Baud 8N2 (8 data bits, no parity bit, 2 stop bits).

- Supply with > 10 V (observe permissible maximum!): The RLA4 operates with loop 1 + 2.
- Supply with > 8 V and <= 10 V: The RLA4 only operates in whip mode.
- Supply with 6 V and modulation of an RS-232 signal with active level of min. 7 V and maximum 8 V: Control in all possible operating modes:

- Value 0 to 126: Loop operation by setting the receiving direction from 0° to 180° in 127 steps.
- Value 127: Whip operation.
- Value 127 to 255: No reaction (reserved for further developments).

4G:

Version 4G no longer has "whip operation". However, it possesses less noise and higher IM resistance.

The data format is 125 Baud 9E2 (9 data bits, even parity bit, 2 stop bits).

- Supply with > 8 V (observe permissible maximum!): The RLA4 only operates with loop 1.
- Supply with 6 V and modulation of an RS-232 signal with active level of min. 7 V and maximum 8 V: Directional control:

- Value 0 to 232: Loop operation by setting the receiving direction from 0° to 180° in 233 steps.
- Value 233 to 511: No reaction (reserved for further developments).

4H:

Version 4H possesses a duplicate fitting of input transistors at each input (8 in total). High-quality SFET are used. This increases the IM resistance and reduces the intrinsic noise. The 4H amplifier requires a little more current (approx. 100 mA total current consumption).