

## **USMERNIK 12V 20A**



The output voltage is fine adjustable with a potentiometer from 12V to 15V. The rectifier is suitable for powering all 12V devices, or devices that are usually connected to a 12V battery or a vehicle with 12V power supply. This voltage is usually 13.8V. For this reason, the rectifier is also set to this voltage, but it is OK for any voltage from 12V to 14V. In this case, the voltage is set somewhere around 13.6V. This voltage determines the resistance in addition to the voltage regulator 78S12. Instead of potentiometer 100R, a resistor 56R is inserted.

The schema is fairly simple, but it is partially summarized from some of the schemes that have been established in the past. The material that was used can easily be obtained from Slovenian stores, which was also a condition when I started designing this rectifier.



Rectangle chart, click to enlarge (gif in 300dpi resolution)

Print circuit template (300dpi image gifs)

Printed circuit board without capacitors (TIFF graphics in 600dpi resolution)

Printed circuit board only capacitors (TIFF graphics in 600dpi resolution)

Mounting scheme (gif picture in resolution 150dpi)

How to use or print images? first click on the link, then right-click the image to open the menu and select "save the picture as ..." and save the image to the disc. To make it easier to print pictures in full size, there is a resolution in addition to the image (300dpi means 300 pixels per inch - colo, 1 inch is 25.4mm)

There is no transformer and network part of the transformer on the primary side of the transformer. Transformer is 350VA (manufacturer: Dolinšek-Dvorec Sonja - Kranj), the primary winding is 230V and the secondary winding is 18V. The secondary voltage of 18V is considered to be a loaded transformer, while the idling voltage is usually higher than 5% to 10% for such power. The transformer is designed in such a way that it can be loaded at 100% load for 24 hours per day, 120% can be loaded up to 30 minutes. 130% to 10 minutes, and times may be several times longer if the transformer is more than 100% cool and has the possibility to cool again after the load has been completed. In short, the transformer easily allows short-term loads also 26A, this is also the maximum flow of the rectifier. The maximum current is determined by emitter resistors, as the BD708 transistor opens on them, and this then transmits the base-emitter connection to all MJ2955 so that the rectifier does not leave more current than allowed. Therefore, short circuits do not damage the rectifier. The router is designed so that it can withstand over 30A, but the limit is also graet 35A. It is, however, that in such things it is good to have sufficient reserves in the power of the material so that smoke signals do not occur. Therefore, short circuits do not damage the rectifier. The router is designed so that it can withstand over 30A, but the limit is also graet 35A. It is, however, that in such things it is good to have sufficient reserves in the power of the material so that smoke signals do not occur. Therefore, short circuits do not damage the rectifier. The router is designed so that it can withstand over 30A, but the limit is also graet 35A. It is, however, that in such things it is good to have sufficient reserves in the power of the material so that smoke signals do not occur.

The primary part of the transformer is connected to the network via a 2.5A fuse and a switch. Since the casing is metal, it is mandatory to use the socket of the safety plug and 3 wire cables, and the casing must be connected to the grounding conductor.



The secondary transformer is connected directly to the grain (rectifier bridge) KBPC35xx such as KBPC3504, graet (GR1) must be mandatory 35A, may also be 50A and suitably cooled. The whole circuit of a rectifier with large capacitors (C1-C10) is printed on the printed circuit board. Serial transistors (5x MJ2955 or Q1-Q5) are mounted on the aluminum profile and the printed circuit board at the same time. The total power of the transistors is 575W, which means they can easily transmit a short circuit, although in the case of a short-circuit at the output of the rectifier, the dissipation on the transistors is maximal. In normal operation, the dissipation is much smaller, since the voltage on the transistors is usually around 6V, which means 3x smaller dissipation than in the case of a short circuit. The cooling rib is HR200 (reseller: www.mali-sp.si ), Aluminum L profile is 5mm in diameter, 50x30 mm in length, 200mm, aluminum is a special shape of 3mm thickness for 78S12 (IC1) and BD708 transistor (Q6), the latter must be cooled and thermally connected to alumunium L profile. Instead of the BD708 transistor, some other PNP transistor with similar characteristics, eg BD712, BD912 can be used.



For a better understanding, carefully review the scheme and photos. In the event of an unclear e-mail, I will not respond, but I will include the answers here in the description of the project. Whatever you do not understand and whatever you would like to know about this rectifier, you can send an email, answer your question then find it here.

The following illustrations show the mounting of the 78S12 voltage regulator, the BD708 transistor to 3mm special aluminum.



Installation of aluminum special shape on alu L profile and assembly of grapes KBPC3504



The pictures show the order of the assembly. The voltage regulator and the transistor are not soldered into the printed circuit after the graet is fastened with a screw. Aluminum profile L is thread M4, in which thread the screw M4x25 holding graetz is screwed and the screw is so long that on the other side of the printed circuit there comes a nut M4, which additionally holds the printed circuit board.

The Alu L profile is located between transistors and a printed circuit board. The transistors screw and connections are insulated with insulating tubes of suitable dimensions.

The aluminum profile is attached to the HR200 with four M4x16 hexagon bolts. A screw with a different head could also be used for fixing, but in this case the screw was the best choice.



The description is not yet complete, I will complete it once again I receive questions. If you find an error, please, please also warn me if something is unclear to you, you can also ask me to complete the description.

If you are interested in additional information about the content of articles, the circuit, the operation, TIV, KIT, ... then put the general question on the <u>forum</u>, and more personal to <u>e-mail</u>.