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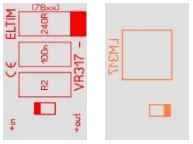
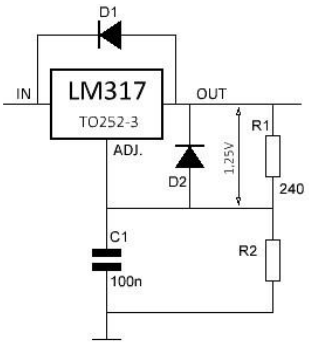
VR317/337 Voltage Regulator modules

In millions of circuits the well-known LM78xx / 79xx voltage regulator IC's are used, despite their tending to oscillate and common regulating behaviour. Since this regulator is part of the audio chain, this device influences the sound of the total, just like capacitors, etc. do. Especially at higher frequencies they tend to "scream", meaning way to sharp S and T sounds, "tinging" instead of "singing" cymbals, etc., simply because the impedance of the supply chain rises at higher load frequencies while using those.
We tried to find a way to improve this and believe we found another piece of the puzzle.

Our VR317/337 regulator modules use the also well-known (for their superior quality) LM317/337 IC's. Just like better capacitors, resistors, etc., the LM317/337 Voltage regulator IC's will improve the sound quality. The sound will become more dynamic, less "chill" and we can trim them exactly to any voltage you like. Our LM317/337 modules are pin-compatible with the 78xx/79xx series, so you can exchange them. Of course, you can use them in new designs as well. These are linear devices, so NO RF-interference!

If the supply voltage(s) is regulated, even today mostly the very old, moderate performing LM78xx, three leg models are used. Basically because they are cheap and easy to use.
Check the datasheet graphs; at higher load frequencies, their dynamic behaviour is poor.
For true High-End purposes there are better solutions available. *VR317 True scale >*





Champion in regulating behaviour, are the LM317 (pos.) and LM337 (neg.) voltage regulator IC's, capable of delivering up to 1500mA.
In the replacement modules we present here, we use small SMD TO252-3 types. Unlike 78xx/79xx they can be "programmed" by the values of two resistors. Since R1 is of a fixed value, the value of R2 defines the output voltage. A capacitor C1 is added for better behaviour, less noise, etc.

These devices are overcurrent, safe operating area and thermal protected.
Board dimensions are only 11x18x6mm, similar to TO220 size.
Double sided though in order to be able to mount and connect all 6 required parts with minimum PCB size and acceptable track widths which are 200%+ calculated, despite the tiny size of the PCB's.

- Highlights of these VR317/337 Voltage Regulator modules:
  - Pin compatible with 78xx / 79xx voltage regulator TO220 types
  - LM317 / 337, TO252-3 SMD regulated output with perfect dynamic response.
  - Floating device, regulating high voltages up to 300Vdc possible (0,8mm creeping distance).
  - Thermal (@180ºC), overcurrent (Imax=1,5A @ low Vdiff only!) and shortcut protection.
  - Modules are pin and size compatible with LM78xx/79xx TO220
  - 11 pre fixed voltage models, both as + and - in range of 3,3 – 30V.
  - Specific output voltage up to 300Vdc on request.
  - The complete board acts as a small heat dissipating device, approx. 2W max. in free air.
  - Mounted by the pins or glued to a surface (IC side to surface!).
  - Dimensions: 18x11x6mm

Output voltage setting

Unlike 78xx/79xx, the regulated output voltages can be changed by the value of resistor R2.
Output voltage regulating is achieved by keeping 1,25V over R1, being 240R usually.
Since the Adj. pin hardly takes current, the current through R1 and R2 can be calculated as 1,25/240= 0,0052A (5,2mA). With this knowledge we understand that the regulated voltage is "lifted" from ground by 1,25V + the voltage over R2, which is calculated as $V_{R2} = 0{,}0052 \times R2$. Add the 1,25V for the resulting output voltage!

Below we calculated the required R2 values for the different VR317/337 versions we provide:

VR317/337 ranges and value table	
TYPE	R2
3,3V	390
3,6V	442
5V	715
6V	909
8V	1300
10V	1690
12V	2050
15V	2700
18V	3160
24V	4320
30V	5490

Other output voltages up to 300Vdc available on request

Floating device

The LM's are specified as regulating from 1,5 up to 37V everywhere. This is **not completely correct** though! Unlike the 78xx/79xx series, the LM317/337 are so called "floating" devices (just as f.e. a transistor, free from ground contacts), meaning that you can regulate even high voltages, as long as the **difference** (Vdiff) between input and output voltages doesn't exceed 37V. F.e. with a 100V output, Vin can be 137V max.

So, with these ELTIM VR317/337 modules you can also make regulated voltages in your Tube Amplifier designs!

You can extend this 37V difference while using a Zener diode (matching the current taken!) in series (in front) with this device, f.e. a 24V Zener extends Vdiff to 37 + 24 = 61V. Best is to calculate with V_{ICdiff} aprox 10V then.

These modules have a ground connection indeed, which is used as reference ground, connected to R2/C1. Actually, the only restrictions in the supply voltage are the space between the tracks and the max. working voltage of capacitor C1. As small SMD it is available up to 300Vdc, so being the max. possible voltage.
With a minimum creeping distance of 0,8mm the modules comply with class IIIa, 320V.

Remarks

For proper functioning, a load of at least 5mA is required. With lower loads the output voltage will rise!
Our VR317 / VR337 modules have no mounting hole. Instead, you can glue the IC side to a heat sink.
Mounted without a heatsink, the power dissipation is around 2W, to be calculated as **Pdiss = (Vin – Vout) * I**
The IC's need at least 2V difference between input and output to regulate properly !

Check our website for ordering

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