

Voltage reference REF102 for improved output current

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The REF102 is a high precision 10V voltage reference, making it suitable for applications requiring low power, excellent stability and low noise [1]. Although it allows single-supply operation from 11.4V to 36V, it must be implemented with other components to achieve a wide output current range.

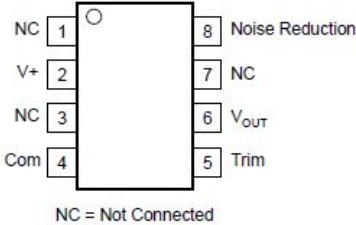


FIGURE 1 – REF102 pin configuration

In the case of an almost exclusively positive output current, the figure 2 shows a circuit that allows an I_L range of -5 mA to +100 mA .

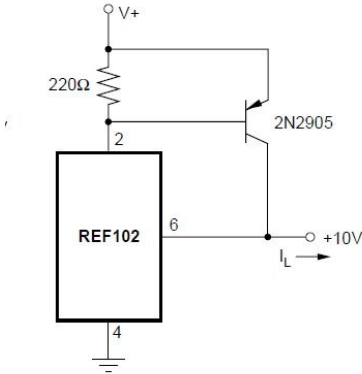


FIGURE 2 – REF102 with output current boosted to +100 mA

By mounting the bipolar transistor pnp 2N2905 [2] in a common emitter mode [3], the current is amplified by a β factor, characteristic of the transistor, according to the formula [4]

$$G_i = \frac{i_C}{i_E} \approx \beta \quad (1)$$

where i_C represents the current at the collector (our output current) and i_E the input current at the base.

Références

- [1] Texas Instrument, Voltage reference datasheet, <https://wiki.epfl.ch/me412-emem-2021/documents/VoltageRef-ref102.pdf>
- [2] Transistor 2N2095 datasheet, <https://alltransistors.com/transistor.php?transistor=1574>
- [3] Paul Horowitz, Winfield Hill, *The Art of Electronics*, Third Edition, Cambridge University Press, 2016
- [4] Kossi Agbeviade, *Cours de mécatronique*, EPFL, 2016