

Circuit Simulation Project

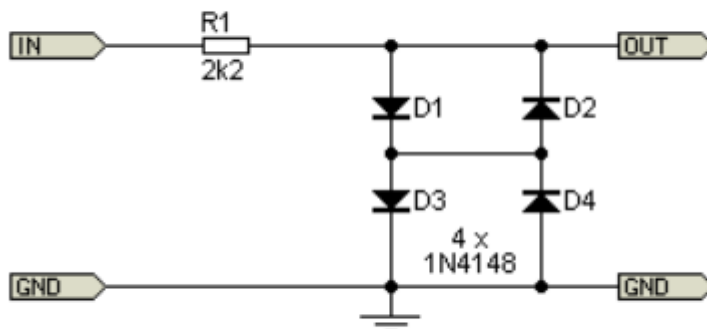
<https://esim.fossee.in/circuit-simulation-project>

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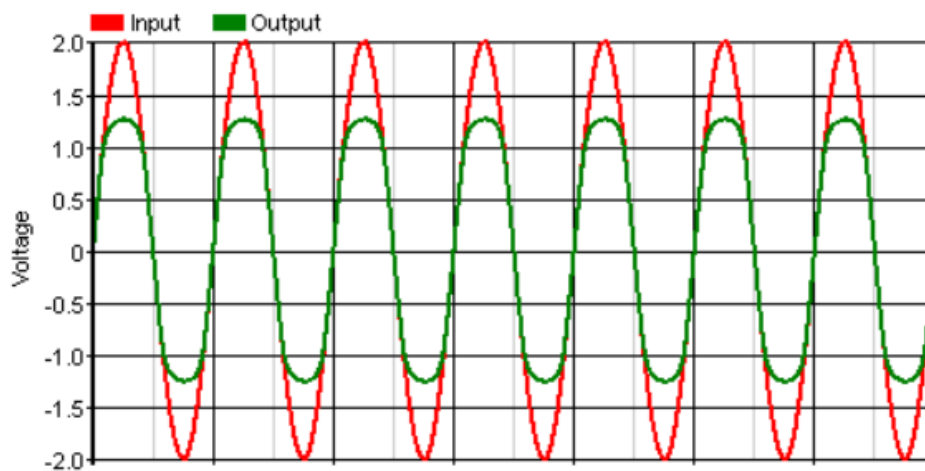
Title of the circuit : LED Soft Clipping Circuit for Signal Limiting

Theory/Description : The LED soft clipper circuit is designed to limit the amplitude of an input signal by harnessing the forward voltage characteristics of light-emitting diodes (LEDs). In this configuration, two LEDs are connected in anti-parallel across the output of a signal path, with a series resistor controlling the current flow. When the input signal amplitude remains below the forward voltage of the LEDs, the output waveform closely follows the input. As the input exceeds the LED forward voltage (typically around 1.7–2 V for LEDs), the corresponding LED begins to conduct, resulting in “clipping” of the output signal at that voltage. Unlike hard limiters that abruptly cut the waveform, this circuit produces a gradual, rounded transition at the peaks, referred to as “soft clipping.” This behavior is particularly valuable in audio circuits and protection applications, where it limits excessive signals without introducing harsh distortion, while also providing visual indication through the LEDs.

Circuit Diagram(s) :



Results (Input, Output waveforms and/or Multimeter readings) :



Source/Reference(s) :

1. Sedra, A. S., & Smith, K. C. (2015). *Microelectronic Circuits* (7th ed.). Oxford University Press.
2. Horowitz, P., & Hill, W. (2015). *The Art of Electronics* (3rd ed.). Cambridge University Press.
3. <https://www.electronics-tutorials.ws/diode/diode-clipping-circuits.html>
4. <https://sound-au.com/articles/soft-clipping.htm>
5. Douglas Self. (2010). *Small Signal Audio Design*. Focal Press.
6. Franco, S. (2014). *Design with Operational Amplifiers and Analog Integrated Circuits* (4th ed.). McGraw-Hill