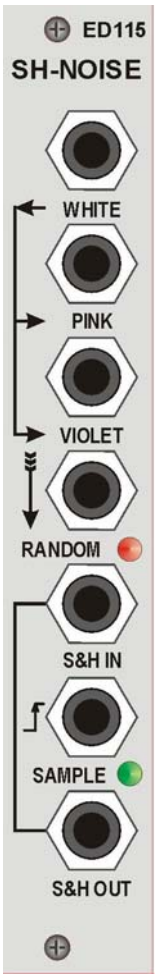
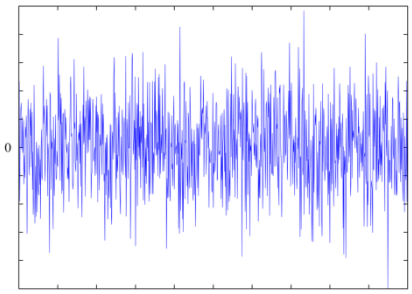
The ED115 – SH-Noise



The ED115 – SH-Noise is comprised of a Noise Generator section and a Sample & Hold section in a 4HP module.

NOISE GENERATOR

The Noise Generator generates a WHITE noise output which is also fed in to a series of filters to generate a PINK output a VIOLET output and a RANDOM output.



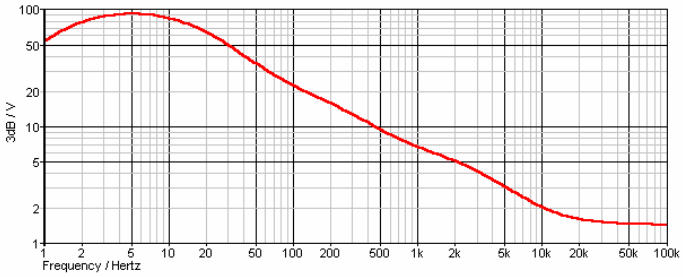
WHITE Noise

The White Noise generator operation is based on the noise generated by the Zener breakdown phenomenon in a BJT inversely polarized base-collector junction. In other words, such shot noise involves the statistical fluctuations of the current flow present in the bipolar transistor.

The generator makes use of a common 2N2907 biased by a constant current source. To increase the amount of shot noise attainable, the collector of the 2N2907 is left open and the base-emitter is reverse-biased. That is, the BJT is connected as a zener diode to exploit the reverse breakdown phenomenon. With this configuration, the reverse breakdown voltage exhibited by the emitter-base junction can be easily observed using an ordinary spectrum analyser. The attainable bandwidth is about 300 MHz, and the power output is about -70 dBm. This signal is passed through an amplifier which sets the output voltage at a nominal 10V peak-peak.

PINK Noise

The PINK filter is a 3dB/octave filter which is pretty linear across the range 10Hz to 15kHz to within 1dB across the full 50dB range. A final stage buffer-amplifier sets the output level to around 10V peak-to-peak.



VIOLET Noise

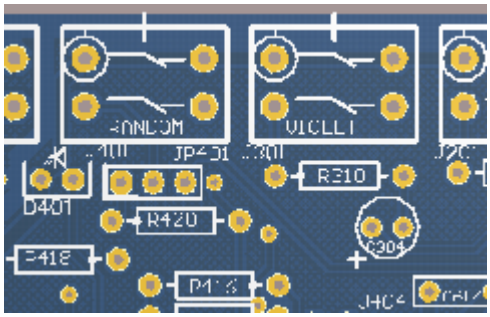
The VIOLET filter has two frequency dependent elements in the feedback path. The first feedback element on its own would produce a 6dB/octave rise in the gain of the amplifier from 0dB at 0Hz via 3dB at 9Hz to 20dB at 90Hz. The second feedback element on its own would produce a 6dB/octave fall in gain from 0Hz to 1kHz above which the gain would remain constant at 0dB.

The combined effect of these feedback elements is that below 90Hz the 6dB/ocatve rise and 6dB/octave fall cancel out, giving a gain of 20dB. Above 90Hz the gain falls at 6dB/octave to 0dB at 1kHz, above which it remains constant. The result being that the bass end of the noise spectrum is boosted, and is available at the VIOLET output. A final stage buffer-amplifier sets the output level to around 10V peak-to-peak.

RANDOM Noise

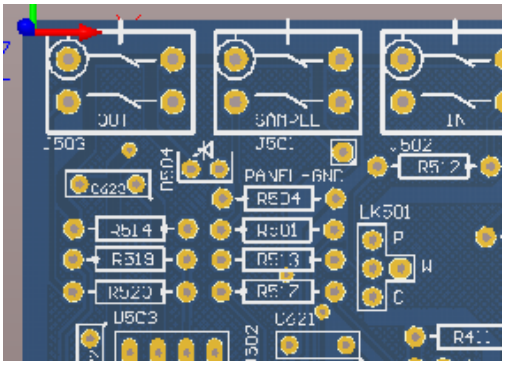
The RANDOM noise output is a low-pass 2nd-order Sallen-Key filter which passes only the very low frequency components to produce an extremely low frequency `random voltage'. Fluctuations of the random voltage are displayed on a LED indicator.

By default, the RANDOM output is an analogue voltage with an output range approaching 10V peak-to-peak. However an onboard jumper allows this output to be steered through a dual comparator to provide a digital output. The analogue output voltage is selected by shorting the lower 2 pins of J401 (nearest to D401).



The digital-random output generates a positive output whenever the random voltage is greater than around +2V, a negative output when the random voltage drops below -2V and a 0V output when the random voltage is within the range -2V to +2V. The comparator output is selected by shorting the upper 2 pins of JP401 (nearest to the VIOLET output).

SAMPLE & HOLD



The Sample & Hold section is derived from that used in the ED109 – TGTSH from Ian Fritz and takes an instantaneous sample of the input signal and presents it to the OUT output. The resultant output is a `random voltage' that changes on each positive edge of the SAMPLE input.

The SAMPLE connector is normalised to the RANDOM output of the NOISE section while the IN connector is normalised to one of the noise section outputs selected by LK501 (W=White, P=Pink, C= VIOLET. Inserting a jack in to any of these connectors will allow an external signal to be used instead.

INSTALLING

We recommend that the module be installed at the far left of your rack. If the module must be mounted elsewhere in your rack then try to keep it away from modules that might be sensitive to high-frequency radiated noise.

Power Consumption	+12V @ 4mA, –12V @ 3ma
Module Width	4HP
Module Depth	102mm

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