



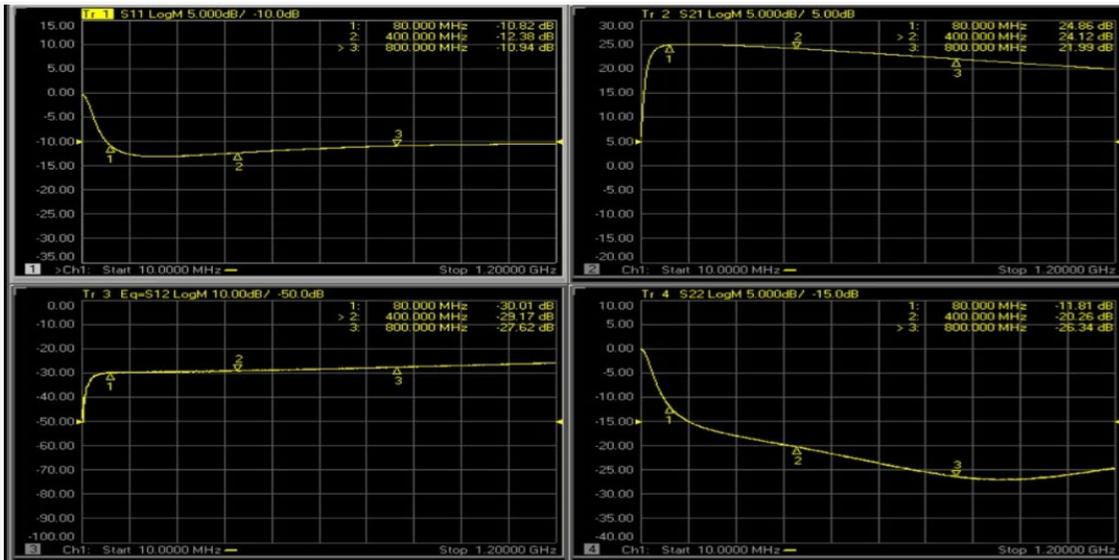
## Legendary Product: GRF4002 Broadband LNA

At Guerrilla RF, we've created a portfolio of RF devices that offer high levels of performance combined with flexibility. Our devices are usable in a wide range of applications and frequencies.

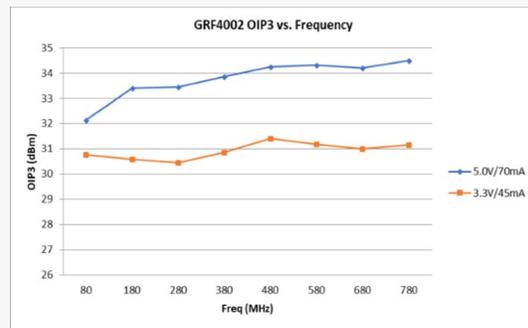
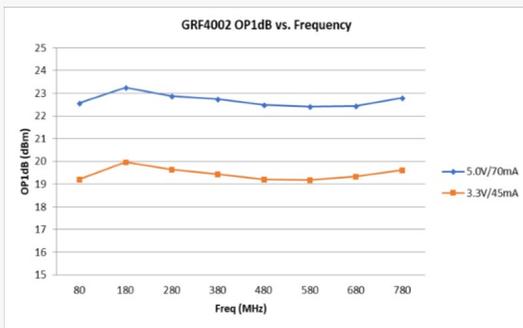
The [GRF4002](#) exemplifies these characteristics. It features outstanding linearity, low NF, bias flexibility, and a wide range of tuning solutions. The [GRF4002](#) has found its way into a number of high-volume applications and the Guerrilla RF applications engineering team is constantly coming up with new ways to deploy it.

Recently we had a customer ask us to tune up a [GRF4002](#) for high linearity and low NF over a decade of bandwidth from 80 to 800 MHz. Take a look at what we were able to achieve.

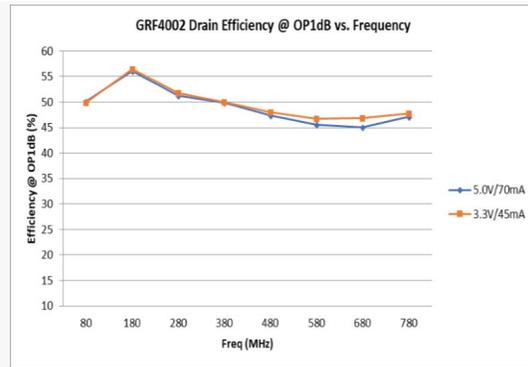
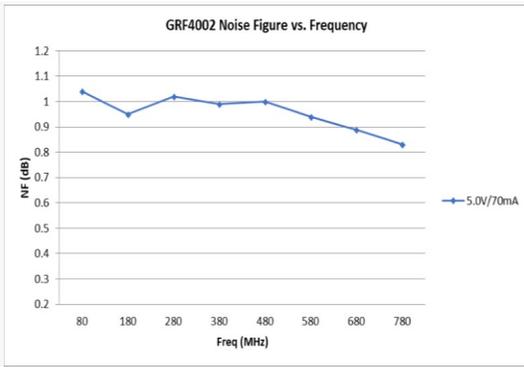
Below is a VNA screenshot of the custom-tuned [GRF4002](#) evaluation board. Note the broadband return losses and relatively flat gain over 80 to 800 MHz. If we varied  $V_{dd}$  over a range from 1.8 to 5.0 volts, the s-parameter traces would change very little. They are largely unaffected by the device  $I_{ddq}$ , with only a slight change in gain as  $I_{ddq}$  is varied from 20 mA to 80 mA.



The two charts below highlight the broadband linearity of [GRF4002](#) at 5.0 and 3.3 volts. Note the low variation in OP1dB and OIP3 over the application bandwidth. This consistent performance is a hallmark of the [GRF4002](#), regardless of the particular tune. It is also characteristic of our pHEMT amplifiers in general.



The next two charts display the NF (SMA to SMA) and drain efficiency (measured at the output compression point) for the tuned board. NF is only presented for 5.0 volts and 70 mA, but it is essentially independent of V<sub>dd</sub> over the 1.8 to 5.0 Volt range. NF holds up well as I<sub>ddq</sub> drops below 20 to 25 mA. Drain efficiency hovers around 50% over the band. The high gain, low NF, and strong linearity at lower frequencies suggest that the [GRF4002](#) can be implemented as an excellent IF amplifier, in addition to an LNA or linear driver.



[GRF4002](#) is in full production and is pin/layout compatible with more than 20 devices using our standard 1.5 x 1.5 mm DFN-6 plastic RoHS package. Evaluation boards and samples are available now.

The measured data shown above is typical of the tuning and data collection we perform on behalf of our customers on a regular basis. We will be happy to do so for you as well!

Contact our applications team at [applications@guerrilla-rf.com](mailto:applications@guerrilla-rf.com) with any questions!

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