



# Application Note

## Proper Procedures for Powering Up and Powering Down an RF Amplifier

### AN006

Sequencing your amplifier on and off improperly can lead to damage of your device. These failures can occur in the lab, during production test or, worse yet, in the field. While lower power devices such as LNAs and gain blocks are typically less sensitive to this sequencing, it is still a good idea to follow the guidelines below.

#### Power-up Sequence:

- 1) Ensure that the device under test (DUT) is properly terminated with the correct source/load impedances and ground connections. In the case of an evaluation board or production test environment, this typically means that the board input and output ports are connected to a vector network analyzer (VNA) or other measurement equipment prior to power-up.
- 2) Apply main power supply  $V_{DD}/V_{CC}$ . As noted in item 1, all required ground connections should be made prior to the application of any voltage to the device.
- 3) Apply enable voltages at a time  $\geq$  the time when  $V_{DD}/V_{CC}$  is applied. The key point here is that  $V_{ENABLE}$  should not occur prior to the application of the drain/collector voltages of the amplifier.
- 4) Apply RF input power. Note: Turning the device on (steps 2 and 3) with RF already applied is known as "hot switching" and is a frequent cause of amplifier damage. During device power-up, the device impedances and gain undergo a transition through a range of values prior to settling. During this time, a device which is stable under steady-state conditions may become unstable. Applying RF power can sometimes lead to destructive oscillations.

#### Power-down Sequence:

- 1) Remove RF input power.
- 2) Bring  $V_{ENABLE}$  voltages to ground potential.
- 3) Bring  $V_{DD}/V_{CC}$  to ground potential at a time  $\geq$  to the time when the  $V_{ENABLE}$  voltages are brought to ground.

Device damage due to improper on/off sequencing is a common cause of electrical over-stress (EOS). Refer to additional App Notes which provide an overview of other causes of EOS, such as RF input power transients, power supply transients and electrostatic discharge.

As always, we are committed to providing the reliable, high-performance RF solutions you need, and we are pleased to provide the applications support you need to successfully implement any of our components.

Contact us at [applications@guerrilla-rf.com](mailto:applications@guerrilla-rf.com) for further guidance.

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## Revision History

Revision	Date   Reason for Revision
Initial Release	September 1, 2020