Rohde & Schwarz  
PA Compression Test  
User manual

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# Performing compression measurements

Input Power (Pin)

Output Power (Pout)

Gain  
G(f, Pin)

S1

a1

b1

S2

a2

b2

Power Cal. Plane

Calibration Planes

Port1

Port1

Figure 1: General compression test setup

To perform a useful amplifier compression measurement, we need to be able to accurately measure the input power Pin and the gain G of the amplifier under test. In general, the gain of the amplifier is a function of both frequency and input power. Therefore, we need to take “2D” measurements (versus both frequency and power), while accurately measuring both Pin and the S-parameters of the amplifier (specifically gain, or S21).

To this end, we need to perform a power calibration of the reference receiver at our driving port (a1) at the power cal plane shown above (section #). This allows us to measure the value of Pin accurately, to accurately find compression. We will also need to do a standard calibration at the planes shown above (section #) to be able to accurately determine the gain of the amplifier, and therefore determine if we are in compression.

Once we’ve done this, we can then use PA Compression Test to perform 2D measurements and calculate the Pin- and Pout-referred compression points vs frequency. In general, there are two ways a VNA (which can either sweep power or frequency, but not both) can perform these measurements.

1. Frequency Sweep Mode: For a fixed Pin, perform a frequency sweep. Increase Pin between sweeps across the desired power range.
2. Power Sweep Mode: For a fixed frequency, perform a power sweep. Increment the frequency between sweeps to cover the entire frequency range.