VSWR

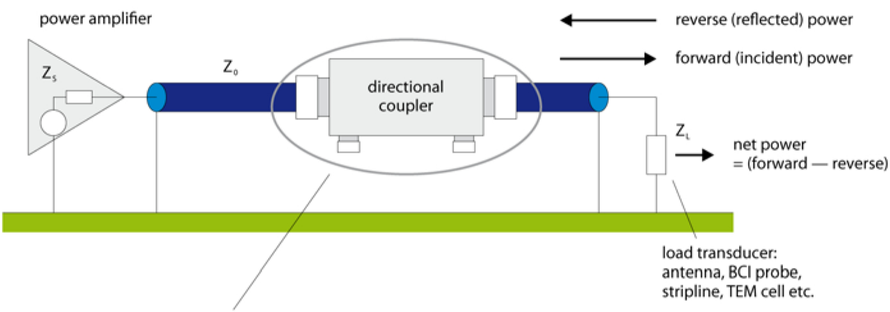
Voltage Standing Wave Ratio (VSWR) describes the match that a source or load offers to its feed cable.

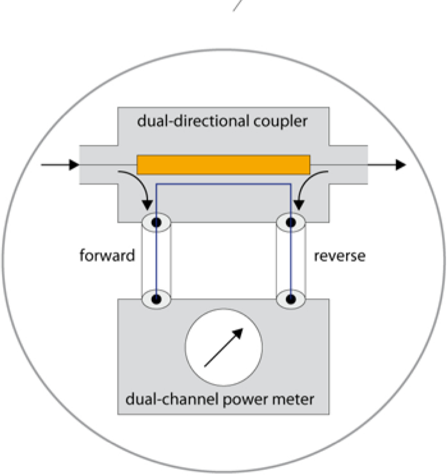
A 1:1 VSWR is a perfect match, i.e. the source/load impedance is exactly 50Ω. The higher the VSWR the worse the match, and the less power can be delivered without being reflected (i.e. the lower the *net* power for a given *forward* power, see below).

VSWR is always ≥ 1 and is related to reflection coefficient (Γ which is alway ≤ 1) by

$$\text{VSWR } K = \frac{1 + |\Gamma|}{1 - |\Gamma|} \qquad \text{Reflection coefficient } |\Gamma| = \frac{K - 1}{K + 1}$$

Forward, reverse and net power





A power amplifier delivers *forward* power into its output cable, which couples this to the load transducer. A mismatch at the load will reflect part of this power back down the cable; this is called *reverse* power. The difference between the two is the *net* power and is passed through the transducer to apply the disturbance to the DUT.

Reverse power is returned to the power amplifier output stage where it is dissipated. In the worst cases of an open- or short-circuited load, the power amplifier must dissipate the maximum reverse power which is equal to the forward power.

A *dual-directional coupler* has two output ports, one of which measures the forward power while the other measures reverse power in the main transmission line. Simultaneous monitoring of both ports with a dual-channel power meter allows the net power to be determined. Each port must always be correctly terminated with a 50Ω load, normally provided by the power meter. The coupler is specified by its coupling factor and directivity:

Coupling factor $= 10 \log (P_{IN}/P_F)$ dB

Directivity $= 10 \log (P_F/P_R)$ dB

where P_{IN} is the input power, P_F is the forward power measured, and P_R is the reverse power measured